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JOINT PROGRAM STUDY

FINAL REPORT

VOLUME I

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Prepared by:

Joint Service Acquisition Program Management Study
Ad Hoc Group

AFLC

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JOINT AGREEMENT
ON
REPORT OF JOINT LOGISTICS COMMANDERS
AD HOC GROUP ON JOINT SERVICE ACQUISITION PROGRAM MANAGEMENT

We approve the Final Report of our Ad Hoc Group on Joint Service Acquisition Program Management (JSAPM) and have agreed to:

1. Recommend that all new program starts should be certified as joint or not joint programs.

2. Expedite JSORs, MOAs, and program funding for joint programs.

3. Provide all joint programs with adequate staff and jointly approved charters. We will establish joint program offices for all major joint programs.

4. Work with Service headquarters to baseline all joint programs no later than the beginning of Full Scale Development.

5. Harmonize business practices among our commands where appropriate.

6. Establish trial aeronautical, communications-electronics, and ordnance commanders groups to:

   a. Assess the opportunities for joint service cooperative efforts within their commodity areas.

   b. Determine the impact of institutionalizing the groups in terms of resources required and payoffs.

   c. Propose charters for the groups, if warranted.

7. Approve the JSAPM final report and briefing for distribution and presentation outside our commands.

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DATE: SEP 20 [illegible]

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EXECUTIVE SUMMARY

Recent trends suggest that the future will bring a significant increase in joint Service development and procurement programs. These trends will require a fundamental change in the traditional single Service orientation of the Services with respect to system acquisition. The number of joint programs has increased gradually from 20 percent of major programs to 25 percent of major programs over the last decade. This trend may accelerate in the future in response to several developing pressures:

- Increased doctrinal emphasis on joint warfighting and interoperability of forces
- Deployment of emerging technologies which permit integration of multi-Service C^3I assets and force structures.
- Increased Congressional demands for greater cost-effectiveness in military procurement

Recent Congressional assessment of the responsiveness of the Services to these military, technological, and economic requirements has not been favorable. In fact, legislation has recently been threatened which would establish a single DoD procurement agency to replace existing Service R&D and procurement commands. Support for such revolutionary solutions to alleged Service parochialism can be expected to increase unless the Services take the initiative to identify more joint program opportunities and to manage joint programs more effectively.

In 1983, a Defense Science Board (DSB) Summer Study of Joint Program Management was initiated. At the same time, the Joint Logistics Commanders initiated a one-year study of joint programs to supplement the DSB effort and collect substantial quantitative data which the DSB could not collect due to time and resource constraints. This report is the result of that year-long JLC initiated effort.

ES.1 STUDY ORGANIZATION, APPROACH, AND METHODOLOGY

The study was conducted by a tri-Service team representing the Air Force Systems Command (Lead), the Air Force Logistics Command, the Army Material Development and Readiness Command, and the Navy Material Command. Approximately 20 personnel from these commands participated on a full or part-time basis over the course of 12 months. Overall guidance was provided by an Ad Hoc committee of four flag officers from these same commands and by a separate advisory group of retired flag officers with extensive experience in material acquisition. Analytical support was provided by The Analytic Sciences Corporation (TASC).

The overall study approach divided the joint program management problem into three distinct phases. These were: 1) Selection, 2) Initiation, and 3) Execution. Data was then collected to identify current and recent practices in each of these phases, the problems associated with those practices and, ultimately, recommendations to resolve those problems and improve the selection and management of joint programs.

The study team pursued several parallel paths in order to gather the data necessary to meet the study objectives. These included:

- Visits to 80 joint programs to collect data and insights from program office personnel
- Collection and analysis of selected data on 50 single Service programs to provide a basis for comparison with joint programs
- Collection of observations and recommendations from 60 joint program managers
- Interviews with 11 high-level managers within the Services and OSD
- Special studies of issues deserving in-depth analysis.

ES.2 SELECTION OF JOINT PROGRAMS

The study team collected data on the origins of the 80 joint programs studied in order to determine the source of the first initiative to create each joint program. Further data was collected on the reasons for jointness and on the role of the Service requirements processes and the JLC panel organizations in identifying and selecting potential joint programs. Analysis of this data yielded several major findings:

- More than 50 percent of all joint programs were originated by initiatives from the Office of the Secretary of Defense, and an additional 10 percent were initiated by Congressional pressure. OSD initiated an even higher percentage of programs with difficult requirement resolution problems
- The Service requirements processes were largely ineffective in identifying potential joint program opportunities. Review of other Service requirements for

potential coordination has been very perfunctory, with little meaningful feedback

- The JLC panel structure is not oriented toward identification of new joint program opportunities, and has not been a source of many joint programs

- There is no formal policy or criteria for selection of joint programs. The selection of joint programs is ad hoc, and little formal analysis is done to support the basic rationale for jointness.

The ad hoc nature of the selection process has led to the establishment of a significant number of joint programs that have subsequently experienced severe problems in the execution phase. These problems included:

- A high incidence of participating Service withdrawals, particularly from OSD-initiated joint programs

- Average cost and schedule growth rates for joint programs which have been significantly higher than the growth rates for single Service programs

- Erosion or loss of potential cost benefits of jointness as a result of these higher growth rates.

Statistical analysis revealed that the factors most closely associated with high cost and schedule growth rates were high funding turbulence and performance requirements resolution problems. Furthermore, these factors tended to be interrelated, so that both factors were often present in programs with major cost and schedule growth problems. Many joint programs have been initiated without resolving conflicting requirements and without establishing participating

Service funding commitments. A clear need exists for an active and disciplined selection and commitment process.

The Defense Science Board recognized this same need and recommended the creation of a Joint Requirements Management Board (JRMB) to identify and select joint programs. That recommendation has been acted upon, and the JRMB has recently been chartered, with membership consisting of the Vice-Chiefs of the four Services and the Director of the Joint Staff. The creation of this board offers the potential for the Services to assume a more active role in the selection of future joint programs. This concept is fully supported by this study.

The current JRMB charter does not require active review of joint program candidates other than those which may be suggested to the board. In this situation, many joint opportunities might be missed. Therefore, the study team recommends that the JRMB be required to review all major program new starts and certify findings that support a recommendation for, or against, jointness. This requirement will ensure that all major new starts receive active consideration for jointness, and it will also ensure that the Services' rationale for not initiating joint programs is clearly documented when the possibility of jointness is suggested by others.

The study team has also noted that the JRMB cannot hope to review the vast majority of non-major programs for systems and subsystems that are potential candidates for joint development. Therefore, the study team recommends the creation of JLC subordinate commander groups to review, in conjunction with the requirements community, opportunities for jointness in various generic product areas. The subordinate commander groups will recommend candidates for jointness to

the JLC and Service headquarters organizations. The JLC subordinate commanders are uniquely qualified for this role because of their familiarity with both new technologies and the needs and requirements of the operating forces. They would meet periodically to review proposed non-major program new starts for joint potential and would report their findings annually to the JLC.

Finally, the study team recommends that the selection and initiation of a joint program should be dependent upon the satisfaction of certain criteria. These selection criteria are: 1) clear multi-Service need, 2) demonstration of a clear net benefit from jointness (economic and/or military), and 3) successful resolution of all major requirements issues. Once a potential joint program has met these selection criteria, it should not be initiated without establishment of high-level Service commitment to support and fund a joint program.

The initial commitment should require: 1) approval of a Joint Services Operational Requirement (JSOR), 2) approval of a Memorandum of Agreement, specifying Service roles, cost sharing arrangements, and basic program objectives, and 3) agreement on a basic projected program funding profile, including a commitment to pursue such funding in the budget process. This commitment step is the first of three which are recommended for future joint programs. Additional commitment steps should be taken at the time of program office establishment and at the time of the start of full-scale development. These steps are described in subsequent paragraphs dealing with program initiation and execution.

ES.3 INITIATION OF JOINT PROGRAMS

The initiation phase of joint program management involves organization and staffing of a program office and creation of a program charter. The charter should establish the program manager's joint authority and define program objectives, resources, and the responsibilities of key participating Service personnel. The study team examined these aspects of all 80 joint programs. The key findings from this evaluation are:

- A significant number of joint programs are not organized to address the particular problems of jointness. A chief deficiency has been the lack of personnel from participating Services to resolve Service-unique problems
- Participating Service manning levels are significantly below authorized levels. The lack of authorized personnel has compounded the problem of insufficient participating Service representation
- Only one-third of the major joint programs and less than one-fifth of non-major joint programs studied had a jointly approved charter. Thus, critical aspects of program guidance and joint authority were often lacking.

In general, joint programs are not organized, staffed, or chartered to effectively manage the unique challenges inherent in jointness. A clear need exists for more effective initiation of joint programs in order to improve prospects for successful execution.

In view of the problems evident in the initiation of many existing joint programs, the study team recommends three

specific actions to improve initiation of future joint programs:

- Establish a joint program office for all major joint programs and adequately staff that office with personnel from participating Services who can meet the unique needs of each Service
- Establish, organize, and staff program offices for non-major programs as appropriate to meet the particular needs of each program. Ensure adequate participating Service representation in critical disciplines
- Provide a jointly approved charter for each program at its inception. This charter should define the roles and responsibilities of the respective Services, as well as the program manager's authority and the program objectives and scope.

The establishment of a fully staffed program office with a jointly approved charter is the second necessary step in the three step commitment process.

ES.4 EXECUTION OF JOINT PROGRAMS

The findings of the study with respect to the execution of current joint programs have been enumerated, in part, in preceding sections. The major characteristics noted are summarized as follows:

- Joint programs experience significantly higher average cost and schedule growth rates than single Service programs

- Funding turbulence and requirements resolution problems are particularly severe in joint programs and contribute to cost and schedule growth

- Unilateral Service withdrawals and changes in program support are prevalent in many joint programs, indicating deficiencies in participating Service commitment

- Inadequate joint program office staffing and organization have prevented joint program managers from dealing effectively with the unique demands imposed by the broad spectrum of differing Service business practices.

The most significant execution problem facing joint programs is a lack of program stability. This problem plagues single Service programs as well, but instability in both funding and requirements is even more severe in joint programs than in single Service programs. As noted previously, joint program instability in execution arises frequently from improper program selection and initiation, and the subsequent lack of Service commitments.

The second most severe problem in the execution phase is the plethora of different Service business practices in such areas as management, budgeting, program control, contracting, logistics, test, and personnel. The cumulative effects of these differing business practices burden joint program managers and make joint program execution more difficult than necessary. A major effort must be made to reduce these differences as much as possible.

The third step in the commitment process will improve the stability of joint programs. This third commitment step should occur at, or near, the start of full-scale development,

and would require high-level approval of a joint program baseline agreement.

A program baseline is a brief descriptive document setting forth basic program requirements and content as well as funding profiles for development and production. The baseline also defines a mechanism for control and approval of all changes. This mechanism is established to deter program changes, particularly unilateral changes, and to establish accountability for those changes that do occur. The baseline represents a contract between the Services participating in a joint program. It is a reaffirmation of the Services' commitment to the program, and should build upon the inter-Service agreements generated at Steps One and Two of the commitment process. Baseline agreements, once approved, should significantly reduce the instability that has plagued joint programs in the past.

The joint program study team also recommends that the Joint Logistics Commanders initiate efforts to standardize differing Service business practices to the maximum extent possible. The JLC are in a position to influence many of the business practices of the acquisition communities. Although many Service-unique practices are based on legitimate differences in operational requirements, others have simply developed as management traditions over time. These latter practices can, and should, be standardized to reduce confusion and conflict in the management of joint programs.

ES.5 CONCLUSION

The joint program study has noted several military, technological, and economic trends that point to an increased

emphasis on joint Service programs in the immediate future. In the past, the Services have not assumed a leadership role in the establishment of joint programs and have not made the necessary commitments to execute joint programs consistently well. The actions that must be taken by the Services to improve the selection, initiation, and execution of future joint programs are clear.

1. INTRODUCTION

1.1 THE BACKGROUND OF JOINT PROGRAMS

Historically, the Army, Navy, and Air Force have tended to operate as separate entities, planning for and meeting the equipment needs of their individual Services independently. The last ten years, however, have seen a marked change in this single Service acquisition environment. Joint Service acquisition programs are an increasingly common method of operation, entailing varying degrees of cooperation and coordination between the Army, the Air Force, the Navy, and the Marines. Traditionally, the definition of a joint program has been limited; it implied two or more Services working together in a fully integrated program office to develop and procure substantially similar end items. The Joint Program Study (JPS) considered a much broader array of inter-Service working arrangements as joint programs based on joint program definitions provided in the JLC Guide for the Management of Joint Service Programs. Services that worked together, even if not physically colocated, to procure common or Service unique end items, to share a technology, or to operate as a buying command for the other Service(s) were considered as participants in a joint program.

Viewed in this manner, the growth of joint programs over the last ten years is clearly evident. Figure 1.1-1 shows that as a percent of all major weapon systems programs, joint programs are increasing by both dollar amounts and actual numbers of programs. In FY1975, joint programs represented less than 10 percent of the budget for all major weapon

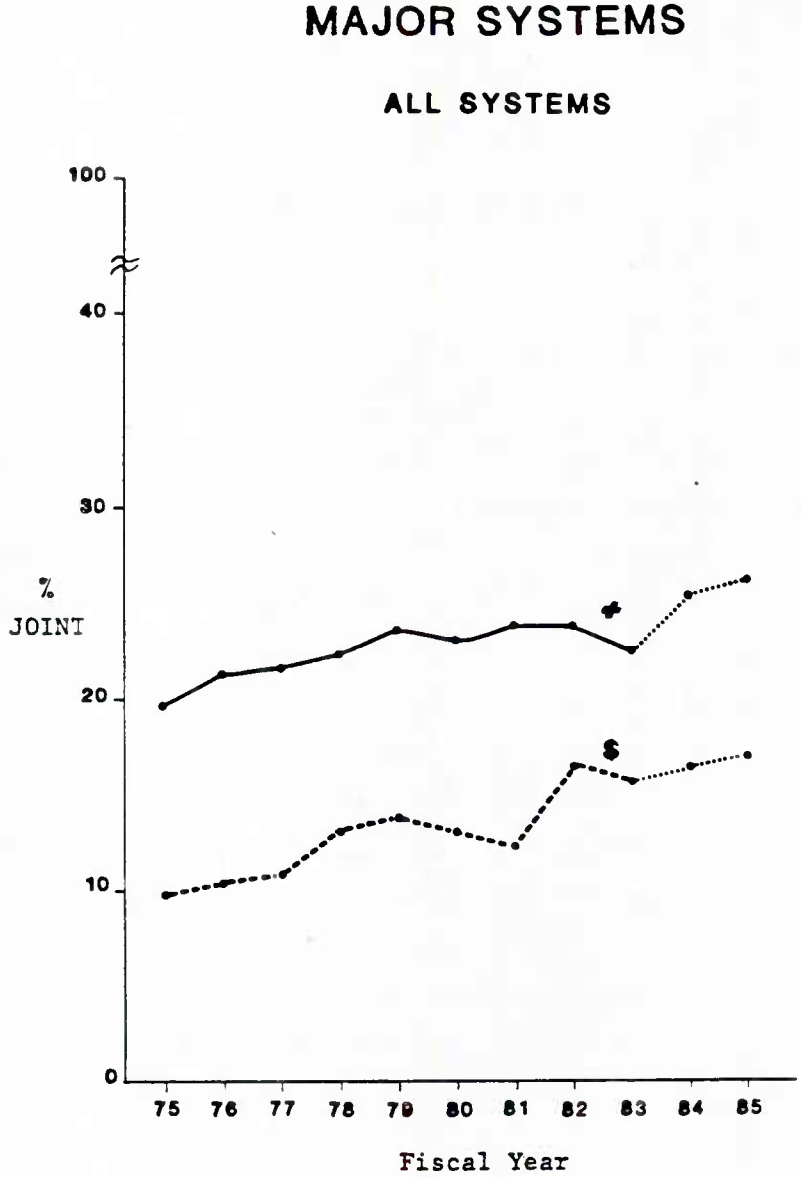

Figure 1.1-1 Trends in Joint Programs

systems programs and only 20 percent of the total number of all major programs. In FY1985, joint programs represent 17 percent of dollars and 26 percent of the numbers of programs. Figure 1.1-2 shows this same information with certain key major systems removed from the total. These programs were removed from the total because they were systems that could not have been selected as joint programs (e.g., ships and strategic bombers). With this adjusted total, joint programs represent an even greater percent of dollars and numbers of

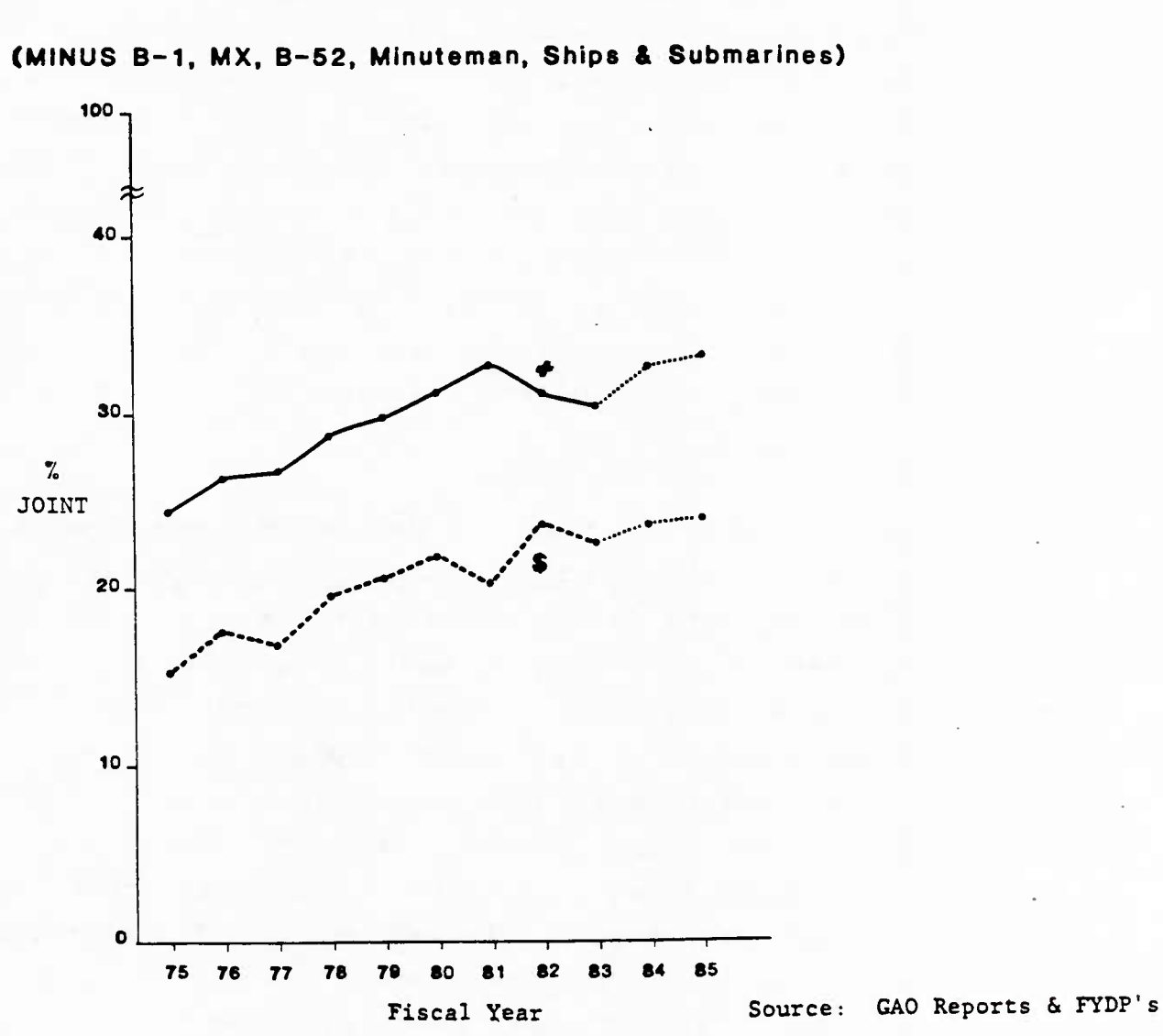

Figure 1.1-2 Trends in Joint Programs with Strategic Systems and Ships Removed

programs. As a percent of dollars (for all possible joint programs), joint programs rise to 24 percent in 1985. As a percent of total numbers of programs, joint programs rise to 32 percent in 1985.

There are several reasons for this increase in the number of joint programs. The most obvious and most often cited rationale for establishing a joint program is the potential for cost savings. When two or more Services have a requirement to develop a similar capability or procure a similar end item, it makes financial sense to work together, taking advantage of any cost savings that result from economies of scale and from avoiding duplication of effort. In an economic environment that is at best unpredictable and where resources are limited, the Services are more likely to meet their needs if they work together, maximizing their buying power.

Another equally important rationale behind joint programs is the trend toward joint warfighting. Two recent agreements* between the Chiefs of Staff of the Air Force and the Army and between the Chief of Staff of the Air Force and the Chief of Naval Operations establish cooperation on long-range planning and weapon system development in areas of mutual concern. Emerging technologies that lead to increasingly sophisticated weapon systems that cut across the missions of individual Services and the escalating costs of these systems push the Services toward more joint operations. Development of an effective deterrent demands that the Services take advantage of these technical opportunities to strengthen their force capabilities. Only by coordinating their efforts will the Services be able to get the most capability from their limited resources and maximize the potential inherent in joint warfighting.

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*Memorandum of Understanding on Initiation of a Joint U.S. Army-U.S. Air Force Development Process, 2 November 1983. Memorandum of Agreement on Joint USN/USAF Efforts to Enhance USAF Contribution of Maritime Operations, 9 September 1982.

The interoperability of equipment purchased by the Services is a key ingredient of joint warfighting. The ability of combat commanders to cross-attach units is significantly enhanced when their equipment is similar and when supply and maintainability requirements are, therefore, similar. The most dramatic example of the increased effectiveness is in C^3I systems. Recent operations in Grenada graphically demonstrated the need for joint warfighting and the inherent difficulties that occur when the Services involved cannot communicate with one another.

1.2 THE IMPORTANCE OF JOINT PROGRAMS

The justifications for establishing joint programs, cost savings and joint warfighting or interoperability, have stimulated the interest of organizations external to the Services. Both OSD and Congress have demonstrated a strong interest in joint programs and a tendency to initiate joint programs where they perceive that the Services have not or will not do so of their own accord. Joint programs increasingly appear to be a new fact of life in weapon system acquisition. Although joint programs provide the potential for tremendous benefits, they also bring to acquisition management an entirely new set of challenges. If the Services are to be successful in the selection and execution of joint programs, it is imperative that they develop a thorough understanding of the unique problems that are associated with jointness and learn to cope effectively and efficiently with this changing environment.

1.3 JOINT PROGRAM MANAGEMENT STUDY BACKGROUND

The Joint Program Study grew out of a need to better understand the nature of joint programs and how to manage them effectively. The study was chartered in June 1983 by the Joint Logistics Commanders (JLC) to assist them in improving their knowledge of how joint programs work and to clarify their role in the joint acquisition process. The purpose of this study was to assess past and current joint acquisition programs and to make recommendations as to how to execute these programs more effectively.

The Joint Program Study came in the wake of two other studies on joint acquisition programs. The General Accounting Office (GAO) and the Defense Science Board (DSB) had both undertaken studies in this same time frame. The GAO, however, dealt only with major systems and, therefore, did not address a significant portion of joint Service endeavors. Neither the GAO nor the DSB study had amassed an in-depth data base of programs or attempted a quantitative approach. The GAO recommended greater congressional oversight, development of specific selection criteria, greater JCS involvement in requirements, and earlier merging of single Service programs. The primary outcome of the DSB study was a recommendation to establish a Joint Requirements Management Board (JRMB) to determine those systems that ought to be jointly developed and procured. The DSB also recommended that the JLC develop a process to consider subsystems for jointness and to establish more effective execution practices.

The study chartered by the JLC was specifically designed to add to the studies already completed by filling in those areas where little information was currently available.

This intensive, in-depth study ran from June 1983 to June 1984. The structure of the study group is shown in Figure 1.3-1. Air Force Systems Command was the lead command and provided the study director. Personnel from Air Force Logistics Command (AFLC), U.S. Army Materiel Development and Readiness Command (DARCOM), and Navy Material Command (NAVMAT) formed the rest of the study group. A five person steering group consisting of four retired Flag Officers (two Air Force, one Army, and one Navy) and the Vice President of the support

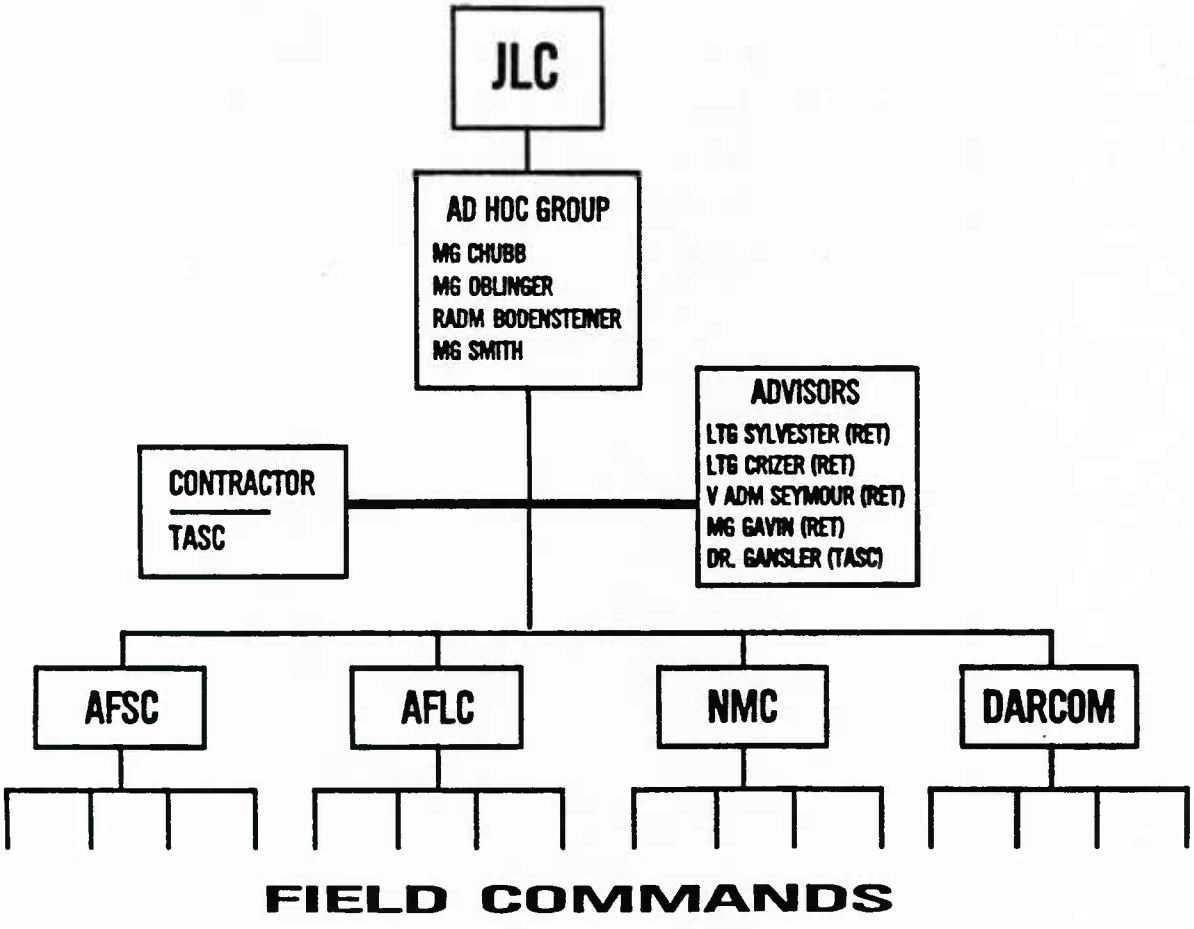

Figure 1.3-1 Study Group Structure

contractor advised the study group. There was also an ad hoc committee composed of three two-star generals and one rear admiral, each of whom served as a representative for one of the joint logistics commanders. The study group was colocated with the support contractor, The Analytic Sciences Corporation (TASC), in Rosslyn, Virginia. Figure 1.3-2 shows the personnel involved in the study.

The outcome of this study has provided some striking insights into the management of joint programs. Not only is it unique in the depth and breadth of information collected, but it stands out in that it explores issues not covered anywhere else in the relevant literature. Chapter two presents the study methodology. Chapters three, four, and five present the findings and recommendations for the three phases of joint acquisition management, selection, initiation, and execution. The final chapter provides a summary of key findings and recommendations.

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Figure 1.3-2 Study Personnel

2. METHODOLOGY

2.1 METHODOLOGY OVERVIEW

The Joint Program Study (JPS) is a detailed study involving many steps and resulting in both a central study on the selection, initiation, and execution of joint programs and a series of ancillary study efforts germane to the issue of joint acquisition management. Figure 2.1-1 presents a flow diagram of the methodological approach to the study.

After an initial literature search to determine what had already been written on the subject of joint programs, the first task of the study group was to settle on a working definition of a joint program and target those joint programs that would be included in the study. For the purpose of this study, a joint program was defined as two or more Services coordinating their efforts to develop and procure similar or Service-unique systems, to share a common technology, or to operate as a buying command for the other Service or Services. Section 2.3 covers in detail the 83 programs included in the data base and specifies the breakdown of the various program characteristics.

Once programs were selected for study, the study group developed detailed questionnaires and data packages for use in visits to the program offices and for interviews with the program managers and other program office personnel from each of the 83 programs. The questionnaires provided for the collection of objective, quantitative information such as data on requirements, cost, schedule, performance, personnel,

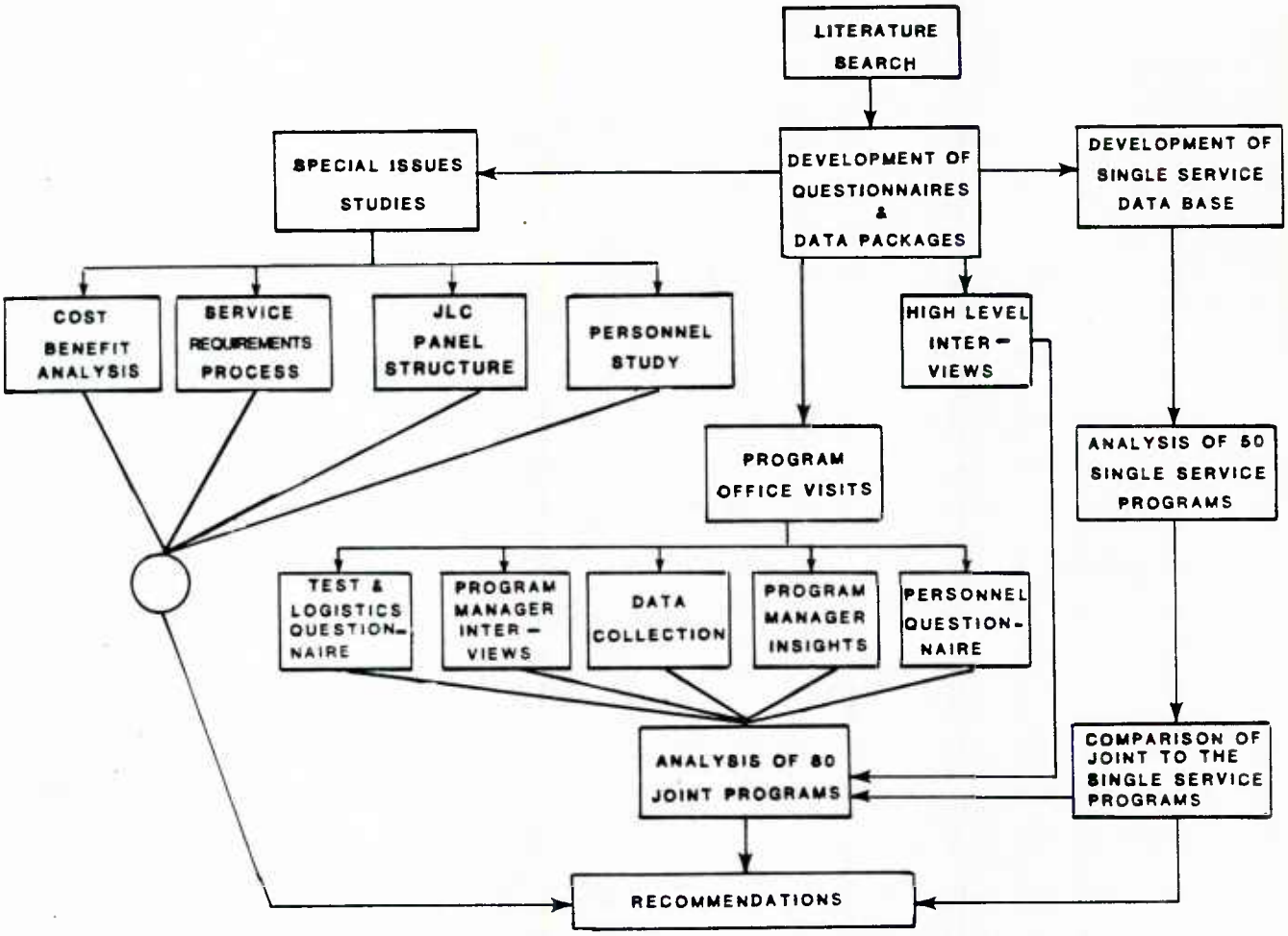

Figure 2.1-1 JPS Methodology

logistics, and test. Subjective information such as the program managers' insights into the key problems associated with joint programs was also collected. The majority of the questionnaires were structured around factors, or program characteristics, that the study group anticipated might logically have an impact on the outcome of the program. Measures of program success were also developed so that the various factors could be correlated with program success. Section 2.6 details the method used to develop success criteria. Sections 2.4 and 2.7 discuss in detail the development of the questionnaire.

Concurrent with this effort, members of the study team conducted a series of 11 high-level interviews with key Department of Defense officials involved in the acquisition process. These interviews were intended to supplement the program office visits and provide a broad, policy-level perspective on joint acquisition management. Details of the questionnaire used for these interviews and the officials with whom the interviews were conducted are specified in section 2.8.

In addition to the development of a large body of information on joint Service programs, the study group also collected more limited information on single Service programs for purposes of comparison. Data on 50 single Service programs was collected from the Selected Acquisition Reports (SARS) and from extensive analysis of R&D and production costs and procurement quantities specified in the five year defense plans (FYDPs). Section 2.9 explains how this single Service data base was developed.

Section 2.10 details the special, ancillary study efforts that were conducted as an addendum to the main study. These additional studies include investigation into the use of cost-benefit analysis to assess the potential costs and benefits of one joint program versus two single Service alternatives, exploration of the Service requirements process, study of JLC panels and groups, study of the unique nature of joint program logistics and test issues, and a joint program personnel study.

The final section, 2.11, explains in depth the analytical techniques, both statistical and conceptual, that were used to analyze the joint and single Service data bases and to make recommendations on how to better select and execute joint programs.

2.2 LITERATURE SEARCH

The first step in the Joint Program Management Study involved an exhaustive literature search on joint Service acquisition. The search concentrated on the resources of the Federal Acquisition Library and on the data bases available from the Defense Technical Information Center (DTIC), The Defense Logistics Studies Information Exchange (DLSIE), and the General Accounting Office (GAO). The TASC collection of acquisition research studies also provided a number of documents relevant to the study.

2.2.1 Availability and Nature of Literature

Unlike previous studies such as the Affordable Acquisition Approach (A^3)* Study, for which over 600 documents on weapon system acquisition were available, the literature search on joint Service acquisition revealed that only a limited number of documents have been written on the subject of joint acquisition programs. Of the 41 documents that were found during the course of the literature search, none were quantitatively oriented or had collected sufficient programmatic information to be useful as a comprehensive source of analysis on joint programs.

2.2.2 Highlights of Key Studies

Although there was an extraordinary dearth of literature in the field of joint acquisition management, the available studies did provide some information on the joint program environment and did offer some ideas as to how to

*The Affordable Acquisition Approach Study, Headquarters, Air Force Systems Command, 15 November 1982.

approach the problem. Two of the key documents that provided a springboard for this study are highlighted below. A complete list of all 41 documents and abstracts for each is presented in Appendix A.

General Accounting Office (GAO) Report, "Joint Major System Acquisition by the Military Services: An Elusive Strategy," December 1983 - This report concentrated on joint acquisition of major systems, including aircraft, ships, missiles, electronics, vehicles, and other high-cost equipment. Based on 15 joint programs, and viewing success in terms of substantial commonality, Service satisfaction, and documentable savings, GAO concluded that there have been no successful joint programs. Major obstacles to success include requirements differences, inter-Service rivalry, and different business practices. The GAO recommends greater congressional oversight, development of specific selection criteria, greater JCS involvement in requirements, and earlier merging of single Service programs.

DSB Final Briefing Report, Joint Service Acquisition Programs, June 1983 - This is the final briefing of the June 1983, DSB, Joint Service Acquisition Programs Study. The study panel reviewed 64 joint programs and found that over two-thirds were successful or had good prospects for success. They did find, however, that joint development programs do not always proceed smoothly, but a single cause of problems is not readily apparent. Joint programs problems can be traced to an inability to resolve requirements differences, shifting service priorities, or funding instabilities. The DSB recommends the establishment of a Joint Requirements Management Board (JRMB) to review requirements and programs for jointness, establishment by the JLC of a formal process for establishing joint subsystem programs, and the development of better execution practices.

An important outcome of the JPS has been the consolidation of an authoritative, organized, and comprehensive volume of information on the nature, problems, and characteristics of joint Service acquisition programs. This body of information, in conjunction with programmatic information collected on 80 joint programs during the study, has established a cohesive and useful data base on the study of joint programs.

2.3 PROGRAM OVERVIEW

Selection of specific joint programs for inclusion in the joint program study was a critical step in executing the study. Selection and execution of joint programs has rarely been the subject of detailed study and what previous efforts exist, examine only a small number of programs in a case study format or focus exclusively on major programs. The Joint Program Study, in contrast, comprehensively analyzes a broad spectrum of joint programs. Information on all types of joint programs, including non-major programs, was collected. Table 2.3-1 lists all 83 programs in the data base. The 83* programs in the data base represent the full range of joint program activity and ensure the statistical rigor and significance of the analysis.

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*Includes 80 joint programs and 3 almost joint programs.

TABLE 2.3-1

LIST OF 83 PROGRAMS

#	PROGRAM NAME
1	AIM-7M - SPARROW
2	AIM-9M - SIDEWINDER
3	ALCM - AIR LAUNCHED CRUISE MISSILE
4	AMRAAM - ADVANCED MEDIUM RANGE AIR-TO-AIR MISSILE
5	AN/AVS-6 - AVIATORS NIGHT VISION IMAGNG SYSTEM
6	AN/TSC 94A/100A - GROUND MOBILE FORCES SATELLITE TERMINAL
7	APG-68 - RADAR
8	ASMS - ADVANCED STRATEGIC MISSILE SYSTEM
9	ASPJ - AIRBORNE SELF-PROTECTION JAMMER
10	ATM - ANTI-TACTICAL MISSILE
11	A-7D - AIRCRAFT
12	BIGEYE - GLU-80B-CHEMICAL BOMB
13	BISS - BASE & INSTALL SECURITY SYSTEM
14	CFFS - COMBAT FIELD FEEDING SYSTEM
15	CHEMICAL/BIOLOGICAL DEFENSE MASK
16	CIP - AIRCRAFT ENGINE COMPONENT IMPROVEMENT PROGRAM
17	CNCE - COMMUNICATIONS MODAL CONTROL ELEMENT (TRI-TAC)
18	COBRA-JUDY - PHASED ARRAY RADAR SYSTEM
19	COMBAT IDENTIFICATION - MK15
20	COPPERHEAD - 155mm CANNON LAUNCHED GUIDED PROJECTILE
21	DMSP - DEFENSE METEOROLOGICAL SATALLITE PROGRAM
22	DRAMA RADIO-DIGITAL RADIO AND MULTIPLEX ACQUISITION
23	DSCS - DEFENSE SATELLITE COMMUNICATION SYSTEM
24	DSCS GROUND STATION
25	EMDP - ENGINE MODEL DERIVATIVE PROGRAM
26	FIREBOLT - AERIAL TARGET
27	FLTSATCOM - FLEET SATELLITE COMMUNICATION
28	FMU-139 FUZE
29	F-100 ENGINE
30	F-111 AIRCRAFT
31	F-4B/F-4C AIRCRAFT
32	GATOR - MINE
33	GLCM - GROUND LAUNCHED CRUISE MISSILE
34	GPS - NAVSTAR GLOBAL POSITIONING SYSTEM
35	GUAYULE - JOINT GUAYULE RUBBER PROGRAM
36	HARM - AGM-88A MISSILE
37	HELLFIRE MISSILE
38	HH-60D - COMBAT HELICOPTER MODERNIZATION
39	HH-60D SIMULATOR
40	HMMWV - HIGH MOBILITY MULTIPURPOSE WHEELED VEHICLE
41	IR MAVERICK - INFRA-RED MAVERICK MISSILE
42	JSTARS - JOINT SURVEILLANCE & TARGETING ATTK RADAR SYSTEM
43	JTACMS - JOINT TACTICAL MISSILE SYSTEM
44	JTDE - JOINT TECHNOLOGY DEMONSTRATOR ENGINE

TABLE 2.3-1

LIST OF 83 JOINT PROGRAMS (Continued)

#	PROGRAM NAME
45	JTF - JOINT TACTICAL FUSION PROG
46	JTIDS - JOINT TACTICAL INFORMATION DISTRIBUTION SYSTEM
47	JVX - JOINT ADVANCED VERTICAL LIFT AIRCRAFT
48	LAB - LIGHT ASSAULT BRIDGE
49	LASER MAVERICK MISSILE
50	LAV - LIGHT ARMORED VEHICLE
51	LLLGB - LOW LEVEL LASER GUIDED BOMB
52	MATE - MODULAR AUTOMATIC TEST EQUIPMENT
53	MEP - MOBILE ELECTRIC POWER
54	MILSTAR COMMUNICATION SATELLITE PROGRAM
55	MPGS - MOBILE PROTECTED GUN SYSTEM
56	MRASM - MEDIUM RANGE AIR-TO-SURFACE MISSILE
57	MSCS - MULTI-SERVICE COMMUNICATION SYSTEM (AN/TTC-39, TRI-TAC)
58	MSER - MULTIPLE STORAGE EJECTOR RACK
59	M-198 HOWITZER
60	OBOGS - ON-BOARD OXYGEN GENERATING SYSTEM
61	PACER SPEAK - RADIO
62	PLRS - POSITION LOCATION REPORTING SYSTEM
63	ROWPU - REVERSE OSMOSIS WATER PURIFICATION UNIT
64	SAHRS - STANDARD ATTITUDE HEADING REFERENCE SYSTEM
65	SCADC - STANDARD CENTRAL AIR DATA COMPUTER
66	SCOTT - SINGLE CHANNEL OBJECTIVE TACTICAL TERMINAL
67	SFDR - STANDARD FLIGHT DATA RECORDER
68	SLCM - SEA LAUNCHED CRUISE MISSLE
69	SAW - SQUAD AUTO WEAPON
70	STANDARD ARM - MISSLE
71	STANDARD SIMULATOR DATA BASE
72	STINGER - MISSILE
73	TACTICAL SHELTERS
74	TAKR - FAST LOGISTICS SHIP
75	TEMPER TENT
76	TIPI - TACTICAL INFORMATION PROCESS AND INTERPRETATION
77	T-46 NEXT GENERATION TRAINER
78	VHSIC - VERY HIGH SPEED INTEGRATED CURCUITS
79	VOLCANO - RAPID MINE DISPENSING SYSTEM
80	WIS - WWMCCS IMPROVEMENT SYSTEM
81	40MM AMMUNITION
82	5 TON TRUCK
83	9MM HAND GUN

While there is tremendous breadth in the joint programs included in the study, it is important to note that two types of joint program are poorly represented in the data base. There is minimal representation of technology programs. Of the 83 programs included in the study, only 4 (Engine Model Derivative Program, Joint Technical Demonstrator Engine, Guayule Rubber, and Very High Speed Integrated Circuits) were technology programs. The second program type omitted from the data base was joint DoD/NATO programs. Only joint programs between the four DoD military Services were included. The scope of the study was intentionally restricted in order to remain within time and resource constraints and to focus on issues of primary interest.

The joint programs included in the data base can be categorized according to many program attributes such as: current acquisition phase, major vs. non-major system, system type, organizational type, phase when made joint, the organization directing jointness, and lead Service. The distribution of programs by system type is represented in Figure 2.3-1. The distribution of the programs studied in many other dimensions is presented in Appendix B. The sample of programs studied was sufficiently large and diverse to establish the credibility of the overall study findings.

2.3.1 Location of Program Office Visits

Collection of program data and interviews of program managers were handled by three to five person teams made up of study group members. Due to time constraints, four teams were used so that information could be collected simultaneously from several programs offices. Team visits were made to program offices at most of the major Army, Navy, and Air Force Systems Commands.

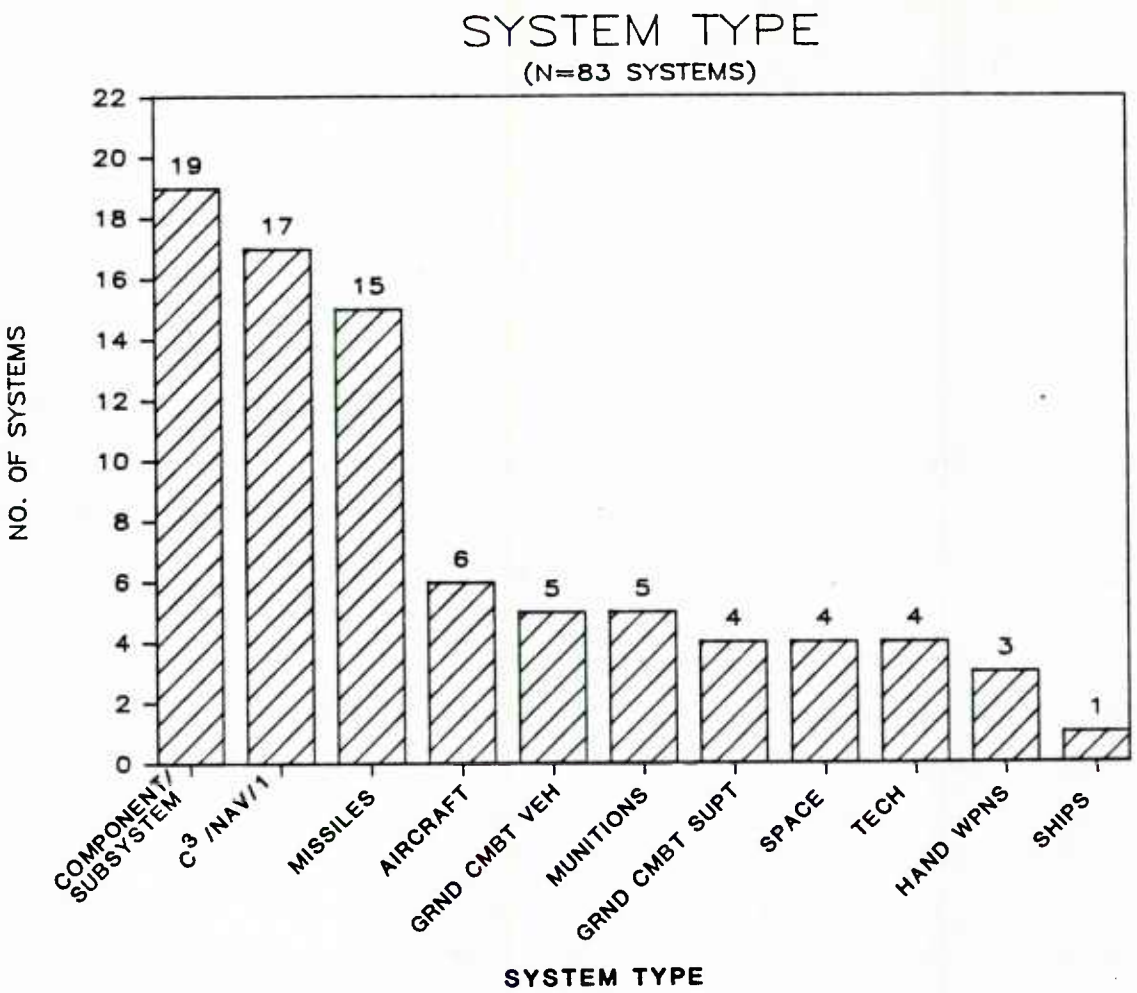

Figure 2.3-1 Distribution of Programs Studied by System Type

2.4 QUESTIONNAIRE DEVELOPMENT

In order to thoroughly and systematically gather information about the 80 joint programs, the study team developed a comprehensive questionnaire that was completed through interviews with program managers and other program office personnel. The questionnaire was divided into seven separate sections. Each section focused on different aspects of program organization, execution, and management. The general structure of the questionnaire is presented in Table 2.4-1.

TABLE 2.4-1

JOINT PROGRAM STUDY QUESTIONNAIRE STRUCTURE

SECTION	GENERAL TOPIC	SPECIFIC FACTORS MEASURED
1.	Requirements	Pre-Joint Environment Origin of the Program Rationale for Jointness Technical Requirements Similarity/Compromise Participating Service Agreement/Enthusiasm
2.	Business Practices	Funding Commitment Acquisition Strategy Cost Estimation/Control Schedule Management
3.	Management	Program Manager Authority Organization/Staffing Oversight Arrangements
4.	Technical Management	Technical Complexity Achievement of Tech Goals Configuration Management
5.	Logistics/ Supportability	Attainment of R&M Goals Joint Support Planning Support Commonality
6.	Test and Evaluation	Joint Test Planning Joint Test Execution
7.	Personnel	Quality of Force Acquisition Experience Personnel Qualifications

Within each of the major sections a number of program factors were measured quantitatively. The measure, in some cases, was subjective, but a conscious effort was made to ensure consistency in standards and criteria used to rate the factors. A detailed description of the factors measured and the measurement techniques employed are contained in Appendix C.

The factor and success measurements derived from this data collection effort were analyzed in order to identify the key factors that seemed to have the most profound impact on the ability of a joint program to succeed, i.e., to achieve its stated cost, schedule, performance, and supportability goals. The identification of these key factors was necessary to support recommendations for criteria that should guide the selection, initiation, and execution of joint programs. The specific measures of success employed in this study are discussed in Section 2.6, and the statistical techniques employed to identify the key factors influencing program success are discussed in Section 2.11.

2.5 THE INTERVIEW PROCESS AND PROGRAM DATA COLLECTION

After developing and structuring the questionnaire and data packages, four interview and data collection teams visited the 83 Joint Programs identified. For the most part, the teams were composed of the following:

Program Manager Interviewers	1 Government 1 TASC
Logistics Interviewer/Data Collector	1 Government
Test & Evaluation Interviewer/ Data Collector	1 Government
Program Documentation Data Collector	1 or 2 TASC or Government

Key members of the various teams met in thorough "harmonization" sessions to standardize their understanding of the rationale behind each factor and to establish a common method of interpreting and scoring the answers to the questionnaire. The size and composition of the teams varied with the

size of the programs being visited, but usually had at least two programs manager interviewers and one program documentation data collector.

Initial program visits were scheduled in the Washington, D.C. area to test the interview and data collection process with minimum time and expense. Other visits were then scheduled at the locations shown in Figure 2.3-1. One to two weeks prior to the actual interviews, the JLC study coordinators conducted prebriefs for the program offices, providing an overview of the study objectives, methodology, and interview and data collection process. When the study teams arrived at the program offices, the various interviews and data collections progressed simultaneously.

The program manager interviews consisted of two study team members alternately asking questions and simultaneously recording the answers provided by the Program Manager (PM) and any other program office personnel that might have been included in the interview. A typical visit lasted three to four hours with brief follow-up visits within a day or two to complete specific data collections or to collect Program Manager insights forms. As soon as practical after the interview, the two Program Manager Interviewers would reach consensus on the scoring of specific questionnaire factors. These scores were then entered on a data sheet for entry into the automated data base. A quality assurance review was also conducted with members of all four teams present to ensure consistency of information.

Collection of program documentation data was accomplished through the use of a detailed data package. The information acquired using these forms provided objective measures of program changes over time as well as measures of

program success in attaining initially defined goals. This package was designed to collect all quantitative data necessary to completing the factors and success criteria contained in the questionnaire. Information on initial and current IOC dates, planned and demonstrated key performance requirements, planned and demonstrated logistics reliability, availability and maintainability parameters, initial DSARC II R&D and production funding plans, and current R&D and production funding plans was available from the SARS for major programs. In the case of non-SAR programs, it was necessary to collect this information from the program offices.

Other program documentation collected included needs documentation (ROCs, SONs, etc.), program plans and directives acquisition plans, charters, MOAs, and test plans. The data package also provided for the collection of information on authorized and actual manning levels and on the dollars expended by each Service on common versus Service unique equipment. Cost benefit analyses detailing the costs and benefits of going joint were sought. A small number of programs said such analyses had been done, but the data collection teams were not successful in obtaining this documentation. Study team members believed that these analyses analyzed the costs and benefits of the system in question and did not address the costs and benefits associated with jointness.

2.6 MEASUREMENT OF PROGRAM SUCCESS

One of the major goals of this study was to develop a system for classifying programs according to relative degrees of "success." The creation of a success measurement technique was necessary for two reasons. First, it was necessary for comparison of the performance of joint programs to theperformance of single Service programs. Many allegations have been

made about the relative performance of joint programs, but none had been empirically demonstrated. The study team wanted to make a direct comparison between two comparable samples of joint and single Service programs in order to determine whether substantive differences do, in fact, exist in the performance of joint programs. Second, it was necessary to differentiate successful joint programs from less successful joint programs so that the factors critical to joint program success could be identified. The identification of these factors, through correlation with changes in success measures, was needed to improve the criteria for selection of future joint programs.

2.6.1 Selection of the Attributes of Success

There have been numerous attempts to measure program success and all have encountered problems. The first difficulty in the measurement of program success is that "success" has many definitions. There are many attributes that measure program success, and not all of them are easily measurable. One important measure, for example, would be the degree of user satisfaction with the product that is ultimately fielded. Unfortunately, there is no practical means to accurately measure such a subjective characteristic as "satisfaction," and even if a crude measure were devised, it is difficult to find a single individual or group of individuals whose perceptions could fairly represent the overall judgment of the operational forces about any particular system. Many attributes had to be ruled out of the success measurement effort due to the impracticality of obtaining a meaningful measurement.

A second difficulty associated with success measurement efforts was that all programs did not have sufficient maturity to provide data for measuring certain success

attributes. Such measures as cost growth rates, technical performance achievements, etc. can only meaningfully be made on programs that have a substantial track record on which progress can be measured. This was clearly a problem with our program sample because of the large number of pre-FSD programs. To address this problem, separate program success measurements were defined for the early phases of the program (initiation) and for the later phases of the program (execution). All of the success measures that could be obtained for each program were collected. The study group then analyzed the factors affecting each success measure by using the subset of programs for which each individual measure had been obtained. Some success measures could be obtained for less than half of the total sample of 80 joint programs. However, this did not prevent the achievement of useful results.

After consideration of numerous alternative measures of success, the study team settled on eight key attributes that were both measurable and meaningful in comparing relative program achievements. These attributes are listed in Table 2.6-1 and are described in detail in section 2.6.2.

TABLE 2.6-1
PROGRAM SUCCESS MEASUREMENTS

INITIATION	EXECUTION
MINIMAL TECHNICAL REQUIREMENTS COMPROMISE	LOW COST GROWTH
HIGH DEGREE OF COMMONALITY	LOW SCHEDULE GROWTH
HIGH HARMONY	ATTAINMENT OF PERFORMANCE GOALS
	ATTAINMENT OF SUPPORTABILITY GOALS
	HIGH HARMONY

2.6.2 Initiation Success Attributes

The three attributes in Table 2.6-1 under the heading "Initiation" measure characteristics unique to joint programs. These characteristics reflect the degree of success in establishing a successful joint effort. A successfully initiated joint program would require minimal compromise in the performance characteristics deemed essential by each of the participating Services, would have a high degree of commonality among the end items to be developed and produced in order to maximize cost savings, and would enjoy enthusiastic and harmonious support of all the participating Services. The study team developed an approach to the measurement of each of these three program attributes that could be applied to almost all of the programs in the sample.

Technical requirements compromise was measured subjectively using a five point scale, as indicated in Table 2.6-2. The application of this rating system required judgments on the part of the study team. Each program was rated based on collective judgment using information acquired from the program offices.

TABLE 2.6-2
TECHNICAL REQUIREMENTS COMPROMISE RATINGS

Rating	Descriptor
1	Significant Differences/Cannot be Resolved
2	Significant Differences/Major Compromise
3	Significant Differences/Minor Compromise
4	Differences Resolved Without Compromise
5	No Significant Requirements Differences

The measurement of commonality was achieved by using an allocation of total program R&D and procurement funds between Service-unique items and common items. A sample calculation of commonality percentage for a hypothetical joint program is presented in Table 2.6-3. It was often difficult to differentiate clearly between funding allocated for joint efforts and funding allocated for single Service efforts. However, the data available in most programs was sufficient to generate a fairly clear indication of the level of commonality in the program.

TABLE 2.6-3
COMMONALITY PERCENTAGE CALCULATION
(ALL FIGURES IN 1,000's)

Line Item	Common Exp	AF Unique	Army Unique	Total
R&D				
System Eng	$1000	$ 50	$30	$1080
Test Artic	200	90	50	340
Support	100	30	40	170
Sys Integ	400	100	200	700
PROC				
Missiles	$9000	$1000	$1200	$11200
Supp Eq	900	90	110	1100
Spares	500	40	30	570
Tech Data	200	-	-	200
Test	400	10	20	430
Sys Eng	2400	300	400	3100
TOTAL:	$15100	$1710	$2080	$18890
PCT COMMON:	$15100/$18890 = 79%			

The measurement of inter-Service harmony associated with each program was also accomplished subjectively, using a four point rating scale. The degree of harmony in both the

selection and initiation phases was rated according to the criteria listed in Table 2.6-4. Once again, the subjective ratings assigned to each program were reviewed collectively by all primary study team members in order to ensure consistency.

TABLE 2.6-4
SELECTION AND INITIATION HARMONY RATING SCALES

POINTS	SELECTION	INITIATION
1	All Services Enthusiastic	No Major Problems or Delays
2	Mixed Enthusiasm High/Moderate	Major Problems or Significant Delay
3	Mixed Enthusiasm Moderate/Low	Major Problems and Significant Delay
4	Major Resistance, Uniformly Low Enthusiasm	Withdrawal of one or More Services

The three initiation success measures, requirements compromise, commonality, and harmony, provided useful distinctions between joint programs that were selected and initiated with relatively few conflicts and those that experienced one or more significant problems. These measures were used by the study team to isolate those factors and conditions most often associated with problems in selecting and initiating joint programs.

2.6.3 Execution Success Attributes

The second set of success attributes selected for evaluation relates to the success of a program in achieving its original cost, schedule, performance, and supportability

goals and in maintaining consistent, stable, and harmonious support of the participating Services through the execution phase. These are commonly accepted and understood measures of program success, and they are measures for which objective empirical data is usually available.

There are several limitations that must be recognized in employing these measures of program success. The first, and most obvious, is that the success of a program in attaining its initial goals will depend upon how ambitious or conservative the original program goals were. Many factors influence the setting of program goals for cost, schedule, performance, etc. The degree to which a program attempts to push beyond the state-of-the-art will influence the ability of program planners to accurately assess the time and resources required to achieve a given level of technical performance. More ambitious programs are more likely to encounter difficulty in meeting early program goals. In addition, there are often political pressures at program inception that influence cost, schedule, and performance estimates.

Although the study team acknowledged this problem, it felt that the collection of success measures for a reasonably large sample of programs would prevent conclusions from being biased by a few programs that had established unusually ambitious or conservative goals. The distribution of biases in two reasonably sized samples of programs should be sufficiently similar so that general conclusions about sample differences are meaningful. There is no way to test this assumption because there is no way to measure relative ambition or conservatism. However, the assumption appears to be reasonable and sample differences are evaluated with full awareness that this potential bias exists.

A second problem encountered in this approach to success measurement is that program goals change over time. Current estimates of how a program will fare in relation to those goals also change over time. The problem of changing goals was resolved by accepting goals established at the start of Full-Scale Development as the standard against which a program would be measured. This was considered to be the most appropriate set of goals for two main reasons. First, the program is sufficiently defined at this point to permit establishment of reasonably precise goals. Second, extensive data was available in Selected Acquisition Reports for goals established for major programs at the start of FSD. The SAR reports contain measures of program progress against these goals, which helped our analysis enormously.

The problem of changing current estimates of projected program outcomes over time was partially resolved by using rates of cost and schedule growth over time instead of the actual cumulative percentage growth experienced at any point in time. This is best explained through use of examples.

The calculation of R&D and Production cost growth rates required two estimates of program cost. The first estimate was the goal established at FSD start. The second was the current estimate. Each estimate was made in constant program base year dollars to eliminate the effects of inflation. The current estimate was also adjusted for any changes in the quantity of items to be procured that might have occurred since the start of FSD. With these adjustments, the current estimate and the development estimate were directly comparable, and a compound annual cost growth rate could be computed. This is presented graphically in Figure 2.6-1.

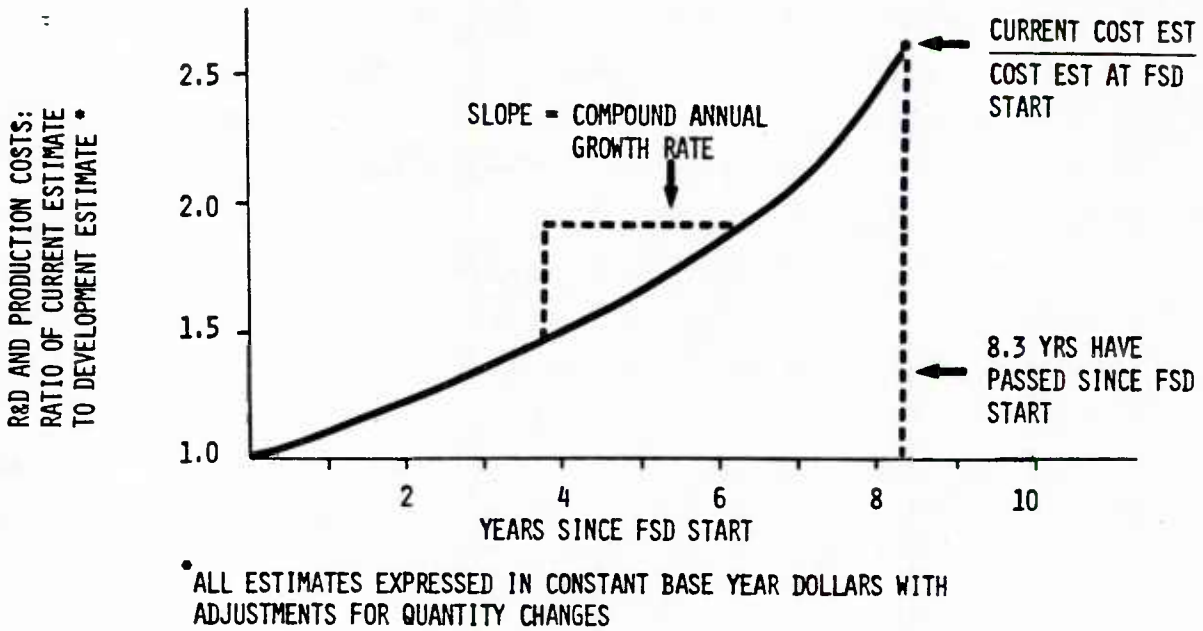

Figure 2.6-1 Calculation of Compound Annual Cost Growth Rates

The slope of the line in Figure 2.6-1 represents the compound annual cost growth rate for the program. This is the measure of success that was derived from the estimates of cost at FSD start and the current cost estimates. This derivation is accomplished by employing the compound interest formula:

$$\frac{\text{Current Estimate}}{\text{Development Est}} = (1+r)^n$$

r: Compound annual growth rate

n: Number of years elapsed from Development Estimate to Current Estimate

To solve this equation for the value of "r" it is necessary to transform it to the following form:

$$\sqrt[n]{\frac{\text{Current Estimate}}{\text{Development Est}}} - 1 = r$$

A compound interest formula was employed to derive "r" rather than a simple interest formula because the observed growth of program cost estimates with time seemed to follow an exponential pattern rather than a linear pattern. This was apparently because very little growth occurs in program cost estimates early in the FSD phase. Most cost growth is incurred as a program progresses toward and into production.

A very similar approach was used to derive program schedule growth rates. In this case, it was necessary to determine a definition for program schedule. A decision was made to use the period of time planned from the start of FSD to achievement of initial operational capability (IOC) as a schedule baseline. This provided a self-defined period that was easily measured and reflected a serious intent on the part of the Services to proceed toward acquisition. In the case of schedule growth, a ratio was established between the current estimate of total months between FSD start and IOC and the development estimate for this same period. The compound interest formula was then used to derive a schedule growth rate, as in the case of R&D and production cost growth rates.

The measurements of performance success and supportability success were derived using pure ratios between estimated achieved values and goals at FSD start. No adjustment was made for the passage of time from FSD start because no distinct pattern could be detected for changes in these ratios as a function of time. The calculation of these values represented a simple arithmetic averaging of values for many individual attributes. The process for calculating these measures is demonstrated using a hypothetical example in Table 2.6-5.

TABLE 2.6-5

PERFORMANCE AND SUPPORTABILITY SUCCESS MEASURE DERIVATION

PERFORMANCE ATTRIBUTES	GOAL	ACTUAL	RATIO	AVG RATIO
RANGE	100 NM	85 NM	0.85	
PAYLOAD	1000 LBS	900 LBS	0.90	0.92
CEP	30 FT	30 FT	1.00	
SUPPORTABILITY ATTRIBUTES				
MTBF	1000 HRS	800 HRS	0.80	
MTTR	1 HR	2 HRS	0.50	0.79
AVAILABILITY	80%	85%	1.06	

The final measure of program success in the execution phase was a measure of program harmony. This measure, like the selection and initiation phase harmony measures (Section 2.6.2), was subjective. The execution harmony measure was also based on a four point scale, as indicated in Table 2.6-6.

TABLE 2.6-6

EXECUTION HARMONY RATING SCALE

POINTS	EXECUTION CHARACTERISTICS
1	Stable Funding/No Major Problems or Delays
2	Unstable Funding by One Service/ Major Problems or Delays
3	Unstable Funding by Multiple Services/Major Problems or Delays
4	Withdrawal of One or More Services

This measure was intended to capture some important attributes of program execution success which were not amenable to easy

quantification, but which were considered to be important to overall assessment of a joint program.

All of the individual measures of program success were analyzed in relation to the various factors described in Section 2.4 and Appendix C to determine those factors that had a significant impact on individual success measures and on multiple success measures. The results of these analyses are presented in the succeeding chapters and in Appendix D. The statistical techniques employed to perform this analysis are described in Section 2.12.

2.7 PROGRAM MANAGER INSIGHTS

The "Program Manager Insights" section of the Joint Programs Study questionnaire posed two questions about the management of joint programs from the perspective of the program manager and the deputy program manager from the participating Service. The first question asked "What were the three most significant management problems that arose as a result of the joint nature of the program?" The second question was "If you had the opportunity to manage the program differently, what would you recommend to improve joint program management?" These two questions were included in the interview process because the study team felt it was important to elicit subjective information on joint program management based on the actual experiences of program managers.

In some cases, these questions were asked during the interview. More frequently, however, the program managers were asked to take time to respond to these two questions and answers were collected later. Information on 60 programs was received. A total of 64 responses were received, 56 from

program managers and 8 from deputy program managers (four programs had responses from both program and deputy program managers). Information on all 83 programs in the data base was not collected either because the program manager was not available or did not complete the program manager insights form, or because the program manager was new and felt he was not well enough informed to adequately answer the questions.

Although there was diversity in the responses received from the program managers, key themes emerged in both the types of problems experienced and the types of recommendations suggested for better program management. The problems encountered by program managers were grouped into the following 11 areas: Funding Turbulence; Technical Requirements; Staffing; Organization; Program Commitment; Business Practices; Program Manager Authority; Test; Congressional or DoD Interference; Parochialism; Logistics; and Schedule. The suggestions offered by program managers fell into approximately the same 11 major categories. The distribution of responses proved to be an important indicator of the types of problems most frequently encountered by program managers. The types of comments within each category were also used to point out areas for further study within the data base. Lastly, some of the key findings of the study were further supported by these insights of the program managers.

2.8 HIGH-LEVEL INTERVIEWS

Members of the study group conducted a series of 11 high-level interviews with key DoD officials experienced in weapon system acquisition. An interview was also conducted with Norm Augustine, now a vice president of Martin Marietta, who has had extensive acquisition management experience in DoD

and is a past Chairman of the DSB. Table 2.8-1 lists the 11 people interviewed and their positions. The intent of these interviews was to gain a perspective on joint acquisition management other than that of the program office and to provide a broad, policy level perspective for the study.

TABLE 2.8-1
HIGH-LEVEL INTERVIEWEES

OSD	ARMY	NAVY	AIR FORCE
HON. J. P. WADE (PRIN DEP USDR&E)	HON. J. R. SCULLEY (ASST SEC RD&A)	HON. M. R. PAISLEY (ASST SEC RE&S)	HON. T. E. COOPER (ASST SEC RD&L)
MR. D. C. LATHAM (DEP USD, C^3I)	LT GEN J. H. MERRYMAN (DEP COS, RD&A)	VADM T. J. HUGHES (DCNO LOGISTICS)	GEN L. A. SKANTZE (VICE CHIEF OF STAFF)
MR. N. AUGUSTINE (CHAIRMAN, DSB)	MG L. C. WAGNER (ASST DEP COS, OPS/PLANS)	VADM A. J. BACIOCCO (DIR, OFFICE RDT&E)	

The questions for the high-level interviews were different than those posed in the program managers' questionnaire. The high-level interviews were, by necessity, much shorter and were oriented more toward policy issues than the day-to-day management and execution of joint programs. Questions asked in these interviews were focused on three main topics. The first was the basic environment of joint programs; interviewees were asked about the goals of joint programs and whether or not they had generally been good or

bad for the Services and systems in question. The second topic focused on the selection of joint programs and whether there was a need for a formal process to establish joint programs and what the role of the Services should be in this selection process. The last topic focused on the management of joint programs, including the stability of joint programs in terms of funding and operational requirements and the manner in which joint program offices should be staffed.

As with the program manager insights, the responses from the high level interviews were grouped into key themes. These centered around the lack of a formal process for establishing joint programs, the need for cultural change within the Services, and the trend toward joint warfighting. These responses were used as direction for further study and some of the insights are used throughout this report to emphasize key findings and recommendations.

2.9 DEVELOPMENT OF A SINGLE SERVICE DATA BASE AND A JOINT-SINGLE SERVICE COMPARISON METHODOLOGY

Many acquisition managers believe that joint programs are more complex to manage than single Service programs because joint programs involve a unique set of acquisition problems. To investigate this issue, the Joint Program Study addressed two key issues. The first was a comparison of how well joint programs met their cost, schedule, performance, and support goals with how well single Service programs met their goals. The second issue addressed the question of whether joint program funding is more or less stable than single Service program funding.

2.9.1 Cost and Schedule Growth Rates, Performance and Supportability Goals

A readily available and fairly standardized source of cost, schedule, performance, and support data for major joint and single Service programs was provided by Selected Acquisition Reports (SARs). December 1982 SARS were collected on 16 joint programs and 36 single Service programs. Table 2.9-1 lists these programs. Data from the SAR reports was used to derive cost and schedule growth rates, and performance and supportability result-to-goal ratios as described in Section 2.6. These execution success measures were derived for both single Service and joint programs to provide a basis for comparision.

TABLE 2.9-1
SAR PROGRAMS

ALCM	AH-64	Harpoon
AMRAAM	AHIP	IFV
Copperhead	AV-8B	IVS
DSCS	B-1B	KC-135
GLCM	Battleship Reactivation	Lamps
HARM	CAPTOR	Lantirn
Hellfire	CG-46	M1
JTIDS	CH-47D	MLRS
Light Assault Vehicle	CH-53	OAS/CMI
Maverick	CVN-68	Patriot
Navstar GPS	DIVAD	Pershing II
Sidewinder	E-3A	Phoenix
SLCM	EF-111	SSN-688
Sparrow	F-14	TACTAS
Stinger	F-15	Trident I
TRITAC	F-16	Trident II
	F-18	Trident Missile
	FFG-7	UH-60

2.9.2 Funding Turbulence

Data to assess the comparative stability of single Service and joint programs in terms of R&D dollars, production dollars, and quantities was also collected. As with the result-to-goal ratios, the measurement concept used was a comparison between the actual figures and the planned figures. For this portion of the analysis, the data source used was the Five Year Defense Plans (FYDPs). The study team first collected five planned expenditure profiles from the FY77 to FY81 FYDPs for RDT&E dollars, production dollars, and units. Data was then collected on the actual expenditure pattern for the FY77 to FY84 time period.

Choosing a measurement approach that employed a simple ratio of planned over actual or actual over planned ($\frac{A}{P}$ or $\frac{P}{A}$ where P = planned and A = actual) was not feasible. In years when nothing was planned or actually spent, the denominator became zero, making the calculation impossible. To avoid this problem, comparisons were made between cumulative percentages in absolute terms to answer the question of how far the program had strayed from its original plan. Thus, the calculation used was the sum of the actual dollars minus the planned dollars divided by the sum of the planned dollars (see equation 2-1).

$$\frac{\sum_{i=1}^{n} |A_i - P_i|}{\sum_{i=1}^{n} P_i} \qquad (2\text{-}1)$$

This equation was calculated for three time periods, one year, three years, and five years. The one year measure compares the percent of the program that was expected to be completed

by the first year according to the plan with the percent of the program that was actually completed. The three year equation compares the percent of the program expected to be completed by the first three years with the percent actually completed in the first three years. The five year equation measures these same percents over a five year period. Equations 2-2, 2-3, and 2-4 show how the funding turbulence measures were calculated.

$$\text{One Year} = \frac{\sum_{i=1}^{1} |A_i - P_i|}{\sum_{i=1}^{5} Pi} \qquad (2\text{-}2)$$

$$\text{Three Year} = \frac{\sum_{i=1}^{3} |A_i - P_i|}{\sum_{i=1}^{5} Pi} \qquad (2\text{-}3)$$

$$\text{Five Year} = \frac{\sum_{i=1}^{5} |A_i - P_i|}{\sum_{i=1}^{5} Pi} \qquad (2\text{-}4)$$

Figure 2.9-1 shows a sample calculation.

Comparisons of these percentages were made for joint and single Service programs for RDT&E and production dollars. Joint programs that jointly funded R&D were compared with single Service programs. Joint programs where one Service was funding only Service-unique items were excluded from the latter comparisons. Comparisons of stability were also made between joint programs in which only one Service funded RDT&E and joint programs where both Services funded common items.

Again, joint programs where one Service was funding only Service-unique items were excluded. Comparisons between joint and single Service program instability were also made in terms of production dollars.

	1977	1978	1979	1980	1981
1977 FYDP (1984$)	50	80	100	111	60
Cumulative (1984 $)	50	130	230	341	401
Actual (1984 $)	30	37	70	75	75
Cumulative (1984 $)	30	67	137	212	287

$$\frac{\sum_{i=1}^{n} |A_i - P_i|}{\sum_{i=1}^{n} P_i} = \frac{30\text{-}50}{401} \quad \frac{67\text{-}130}{401} \quad \frac{137\text{-}230}{401} \quad \frac{212\text{-}341}{401} \quad \frac{287\text{-}401}{401}$$

One Year = 0.05
Three Year = 0.23
Five Year = 0.28

Figure 2.9-1 Sample Calculation of Program Instability

2.10 SPECIAL ANCILLARY STUDY EFFORTS

Four ancillary study efforts were undertaken in parallel with the main study. These were:

- JLC Panel Structure
- Service Requirements Process

- Joint Program Personnel
- Cost/Benefit Analyses.

The first three of these special studies were conducted by members of the Services and the last one by TASC.

2.10.1 JLC Panel Strucuture Study

The panel strucuture study was a review and analysis of the role of the JLC panels in selection of joint programs. The special study group, consisting of Army, Navy, and Air Force members, examined the different acquisition and logistics functional areas to determine those areas that had existing panels working on the issue of joint programs. A matrix of areas covered was developed and areas that needed coverage were identified. Methods to address the uncovered areas and to organize and coordinate the efforts of the JLC panels were developed. A more detailed description and results of this study are contained in Appendix F.

2.10.2 Services Requirements Process Survey

The individual Services' requirements processes, with emphasis on the harmonization process, were examined by a study group of Army, Navy, and Air Force representatives. Personnel from the Services' requirements staff offices also briefed the JLC Study Team and advisors on their Service's requirements process and how they handled requirements from the other Services to select programs for jointness. The JLC Study Team also monitored the establishment of the Joint Requirements Management Board (JRMB) by the Services and the JCS. The study team examined the JRMB charter and the lead secretariat (Army) briefed the team on their draft charter. Additional information is contained in Appendix G.

2.10.3 Joint Program Personnel Study

Quality of personnel in terms of acquisition experience and education is a major concern of the Services at all levels. Each organization naturally strives to attract the best qualified people, but personnel with the appropriate skills and experience may not always be available. There exists a perception that the problem of getting highly qualified personnel is worse in joint Service programs because individual Services are reluctant to assign their best personnel to joint acquisition efforts. Another perception is that staffing a joint program office (JPO) is made even more difficult because assignment to a joint office is often perceived as being detrimental to an officer's career. The personnel portion of the Joint Program Study assesses whether these above perceptions are, in fact, widely held and compares the experience and quality of joint program personnel with single Service program personnel.

The methodology for doing this was designed to assess the education, training, and experience level of joint program personnel, and then to compare these findings with similar information on single Service program personnel. Personnel representatives from Air Force Systems Command, (AFSC), Navy Materiel Command (NAVMAT), and U.S. Army Materiel Development and Readiness Command (DARCOM) developed factors on acquisition experience and quality of force in terms of educational background and potential for promotion. Information on these factors was obtained from personnel records and then comparisons between joint program offices and single Service program offices were made.

In addition to these factors, the JLC Study Team developed a personnel questionnaire. This questionnaire was

administered to military officers currently assigned to joint program offices and evaluated the officers' perceptions of joint program assignments and how those assignments would affect their careers. Details on this study are contained in Appendix E.

2.10.4 Cost/Benefit Analysis

Many of the Program Managers interviewed during the study stated that the principal reason for jointness on their program was cost savings in R&D and/or production. However, very few indicated that a cost/benefit analysis comparing joint versus separate Service acquisition was conducted before the decision to go joint was made. Additionally, on those few programs where there supposedly had been a cost/benefit analysis on going joint, none of the documentation could be located. In response to these findings, the study team decided to determine the feasibility and difficulty of completing such an analysis.

The study team decided to try to identify the cost benefits of the Air Force acquisition of the HH-60D Nighthawk helicopter, which was based on airframe and engine development efforts completed by the Army for the UH-60A Blackhawk and the Navy for the SH-60B Seahawk. This evaluation was a simple test case to explore the potential techniques for conducting such an anlysis which might be applied in future joint program decisions. Details of this cost/benefit analysis are contained in Appendix H.

2.11 ANALYTICAL TECHNIQUES

A number of statistical techniques were employed to analyze the extensive data collected on both single Service

and joint programs during the course of this study. These techniques included fairly simple analyses, such as the comparison of sample means or the analysis of the characteristics of a distribution of values, and more complex analyses, such as correlation and regression of factor and success measures.

2.11.1 Comparison of Sample Means

As noted previously, one of our analytical objectives was to make a direct empirical comparison between the success of single Service programs and the success of joint programs. In order to accomplish this, we computed execution success ratings for a significant number of joint and single Service programs, as described in Section 2.6. We then computed mean values for the success ratings for the two samples and compared these means to determine whether or not there was a significant difference between the average success ratings in the two samples. The differences in the mean values were also tested statistically, using a technique called the Wilcoxon Rank Sum Test, to ascertain the actual level of statistical significance that was represented by the differences in the sample means.

A similar technique was employed to analyze the significance of some factors influencing joint program success. The sample of joint programs was separated into quartiles using individual success measures. A comparison was then made between the average factor values or percentiles for selected factors for all programs in the first quartile and for those in the fourth quartile. We then compared these two average factor values to determine whether a significant difference existed. The presence of major differences in average factor values between the top and bottom quartiles, corresponding to the differences in the success value measurements for the same

two quartiles, implied a potentially significant cause and effect relationship. A hypothetical pattern in success and factor measurements of this type is represented in Figure 2.11-1.

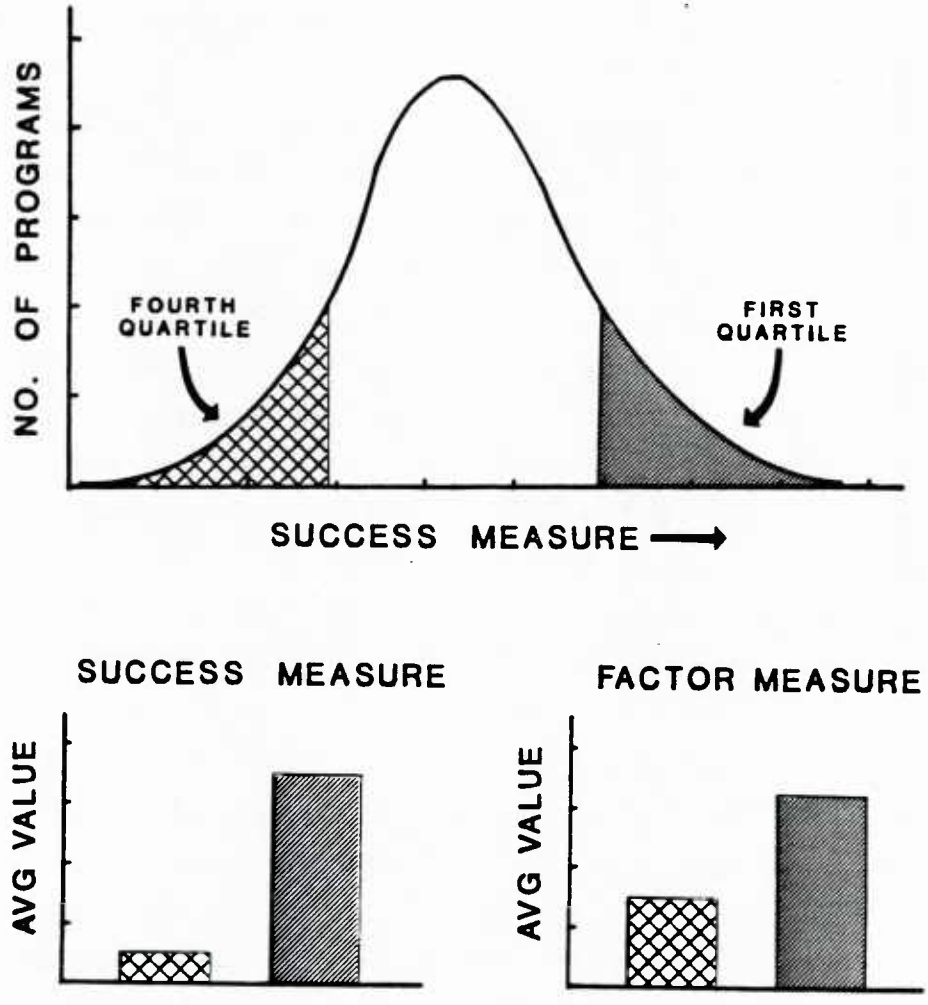

Figure 2.11-1 Comparison of Factor and Success Values

When we found this type of pattern we investigated the underlying data carefully to ascertain that a truly reasonable factor and success relationship existed.

2.11.2 Correlation and Regression Analyses

Other techniques employed to evaluate the significance of factor/success relationships included correlation and regression analyses. These two techniques are similar, yet distinct. Correlation analysis measures the degree of relationship between two variables. The value of a correlation coefficient lies between -1 and +1. A value of either minus or plus one would indicate that all the data points defined by combinations of the two variables lie on a straight line. This implies a very strong cause and effect relationship between the two variables. In the real world, however, such relationships are rare. Rather, a distribution of data points defined by combinations of two variables is normally distributed, as in Figure 2.11-2. However, the distribution may take on a distinct shape, implying a potential relationship between changes in the values of the two variables. If there is no shape to the distribution, i.e., it is randomly scattered, there is no relationship and the correlation coefficient will be near zero. Correlation coefficients were computed for literally hundreds of combinations of factors and success measures to identify those factors that seemed to have the greatest impact on joint program success.

Regression analysis employs techniques similar to those used in correlation analysis in order to calculate the linear relationship between two variables that best fits the distributed points defined by combinations of the two. A hypothetical best-fit regression line is drawn in Figure 2.11-2. The slope of the regression line provides an indication of the degree of change that might be expected in one variable if changes occur in the value of the other. This analysis supplements the correlation analysis by indicating the sensitivity of one variable to changes in another, given

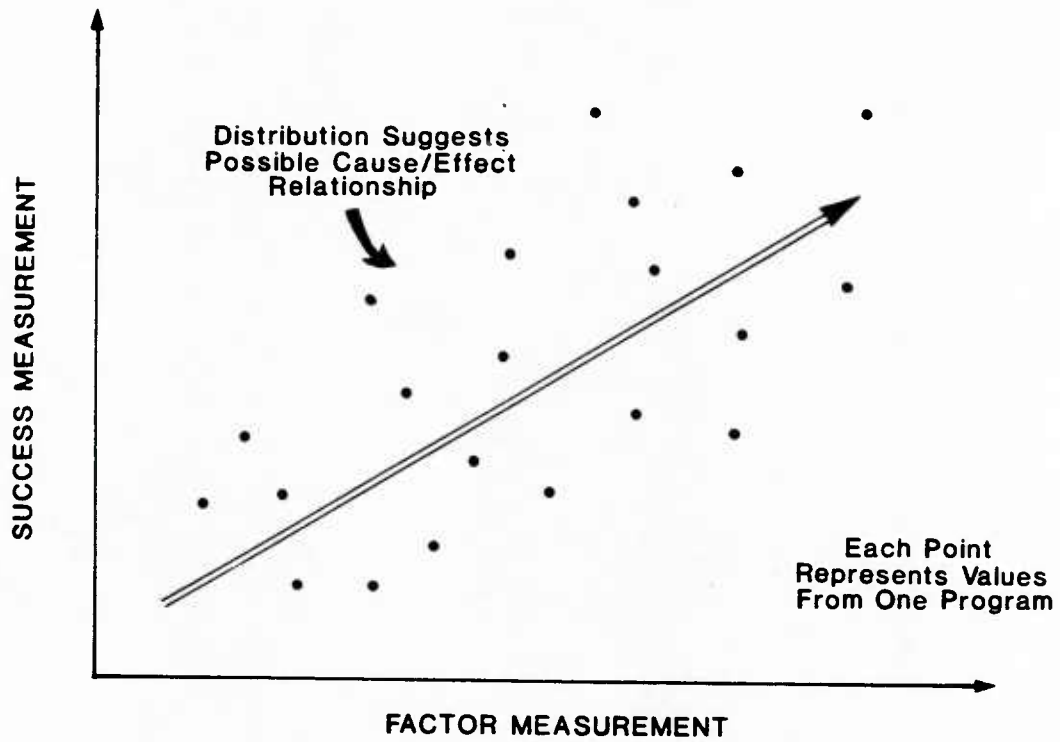

Figure 2.11-2 Correlation of Factor and Success Measures

that an apparent relationship exists between the two. The results of these analyses were combined with analysis of differences between average first and fourth quartile factor values to isolate key factors.

The results of the application of these analytical techniques are presented in Chapters 3, 4, and 5 and Appendix D.

3. SELECTION OF JOINT PROGRAMS

The Joint Program Study focused on three key areas: evaluation of current practices for selecting, initiating, and executing joint programs; identification of the problems that result from these practices; and recommendation of changes that could lead to improvements in all of these areas. The initial portion of the study focused on the joint program selection process. In evaluating recent selection practices, the Study Team examined the source of the 80 joint programs in the study, the rationale for their creation, the criteria used for selection, and the roles of the JLC, Service Staffs, and OSD in the selection process.

3.1 THE SOURCES OF JOINT PROGRAMS

An effort was made to reconstruct the early history of each joint program in the study in order to determine its origin. This was done through interviews with the program office personnel and through review of various documents, memoranda, letters, etc. that provided information relative to a program's origin. In some cases, the primary impetus for a given program is not entirely clear. Many actors, including OSD, the Services, and Congress, are often involved in the early discussions that ultimately result in the establishment of a joint program. Nevertheless, it was possible in the vast majority of cases to identify a clear, primary advocate and sponsor for initiation of individual joint programs.

The percentage distribution of the sources of the 80 joint programs evaluated in this study is presented in Figure

3.1-1. The Office of the Secretary of Defense, including all subordinate organizations such as USDR&E, PA&E, etc., was clearly the dominant source of these programs. More than half of the programs in the sample were originated through OSD initiatives. Another 10 percent were originated through congressional direction or pressure. Thus, a total of 62 percent of the programs in the sample were originated by sources external to the Services. Of the remaining 38 percent, most were originated through actions of the respective Service staffs, although 5 percent were originated by JCS or JLC initiatives. This general distribution suggests that the Services have not been seizing the initiative in identifying most opportunities for joint programs. That is not to say that all of the external initiatives have been appropriate and well-founded. However, a significant percentage of the external initiatives have resulted in ongoing programs whose benefits might have been perceived by the Services if the Service decisionmaking processes had been more attuned to identification of potential joint opportunities.

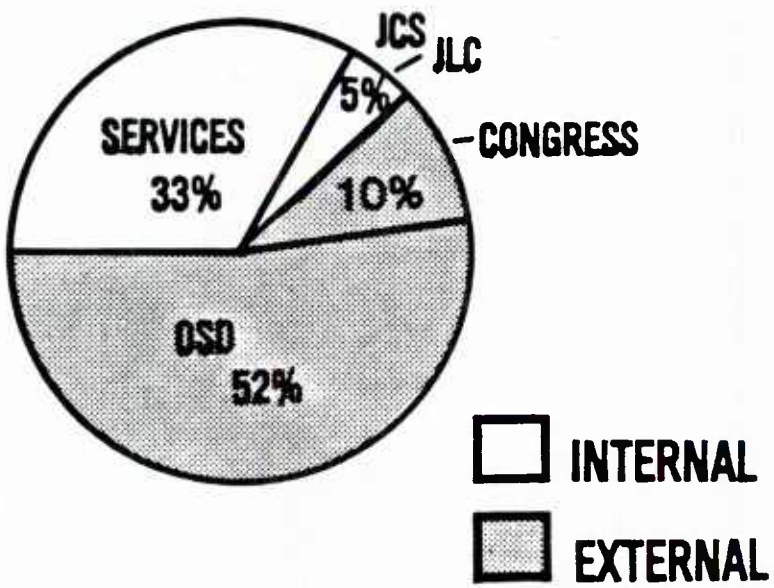

Figure 3.1-1 Sources of Joint Programs

3.1.1 Sources of Major Joint Programs

The dominance of agencies external to the Services in joint program selection is even more pronounced if we examine the origin of the subset of major joint programs. For purposes of our study, the definition of a major program conforms closely to the definition set forth in DoDD 5000.1. A fuller discussion of this definition is contained in Appendix B. Thirty-three of the 80 joint programs in the study were classified as major programs. The distribution of the sources of these programs is presented in Figure 3.1-2. For major programs, approximately three-fourths were externally originated. In contrast, only about 55 percent of non-major programs were externally originated. This suggests that the Services have been especially reluctant to take the initiative to establish major joint programs.

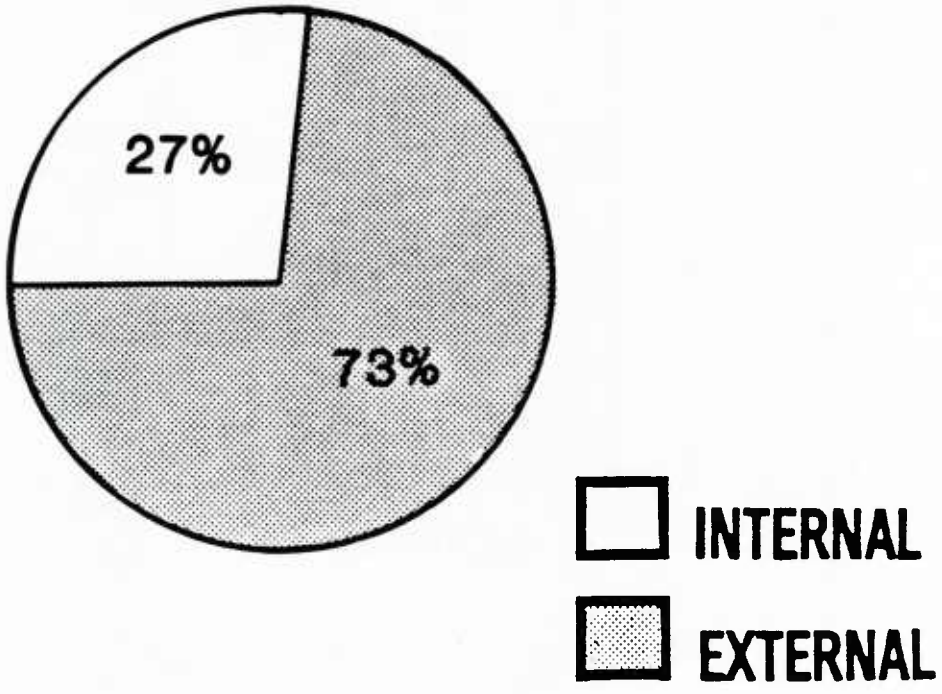

Figure 3.1-2 Sources of Major Joint Programs

3.1.2 Sources of Difficult Joint Programs

The apparent reluctance of the Services to take the initiative in establishing the more difficult joint programs is further illustrated by a comparison of the source of jointness versus the degree of technical requirements similarity in various sets of programs. Such a comparison is presented in Figure 3.1-3.

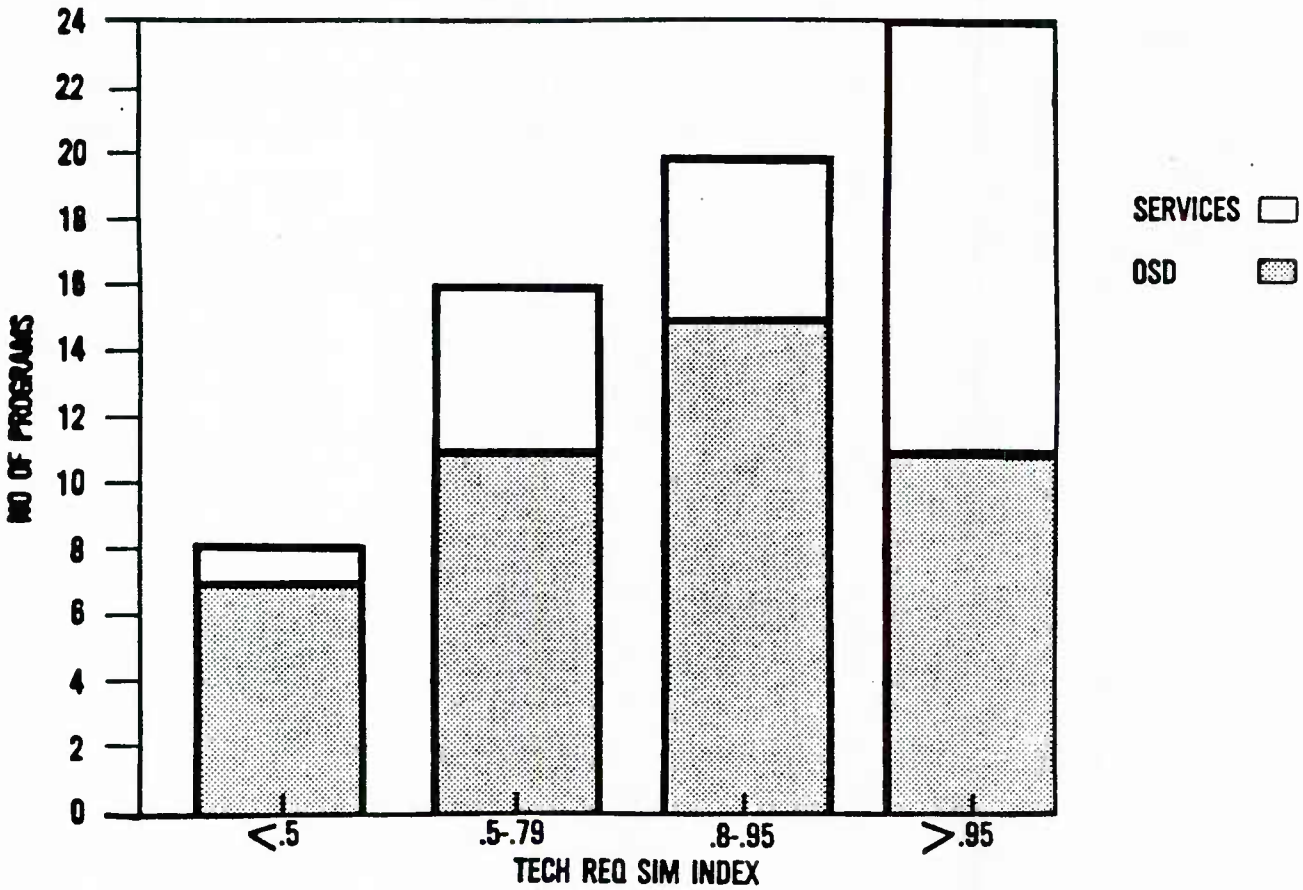

Figure 3.1-3 Sources of Difficult Joint Programs

The height of the bars in Figure 3.1-3 represents the number of programs in each of four subsets of the total joint program sample. The subsets are determined by the degree of technical requirements similarity that existed among the participating Services before each program was established. The measurement of technical requirements similarity was accomplished using the five most important technical requirements established for each program. The actual techniques for calculation of this measure are described in Appendix B. Perfect similarity would be represented by a rating of 1.00. Lesser numbers represent increasing degrees of technical requirements dissimilarity.

Each of the bars is subdivided between those programs originated within the Services and those originated externally. It is evident that the Services originated a much smaller proportion of the programs with dissimilar requirements than they did of programs with very similar requirements. In other words, the Services were reluctant to initiate joint programs when difficult requirements issues had to be resolved. In many cases, the failure to satisfactorily resolve requirements differences has led to severe problems for joint programs. Therefore, it cannot be said that the Services should have taken the initiative to establish the more difficult programs in all cases. Nevertheless, there exists a clear pattern of OSD and congressional boldness and Service reluctance in approaching the more difficult joint opportunities.

The prominence of OSD in the joint program selection process and the corresponding secondary role of the Services is a direct result of a number of institutional characteristics that exist within these respective organizations. In the next section we will examine the performance of OSD and the Services in the process of identifying candidates for jointness.

3.2 IDENTIFICATION OF JOINT PROGRAM OPPORTUNITIES

The identification of joint program candidates is an unstructured process within both OSD and the Services. There is no effective process for systematically reviewing potential candidates and arriving at recommendations for, or against, jointness. Rather, the process can be generally characterized as ad hoc, with the creation of joint programs generally resulting from the initiative of individuals who can influence the decisionmaking process more than from any institutionalized review process.

3.2.1 OSD Initiatives

An examination of the list of joint programs which have been initiated by OSD reveals a rather diverse pattern of circumstances leading to program initiation. Some programs were established based on strong sponsorship by a high-level OSD figure. The TFX program is a prime example of this phenomenon. Others are originated based on conceptual work completed within DARPA or other OSD-supervised agencies that attracts strong backing within the OSD organization. The Joint Tactical Missile System (JTACMS) and the Joint Target Surveillance System (JSTARS) are two current examples of systems with DARPA origins. Others have been originated after a special study identified a particular multi-Service need or technical opportunity which was endorsed by OSD. The ADA, VHSIC, and STARS programs are examples of current programs with this type of history. Occasionally, strong congressional sponsorship for a concept will force OSD and then the Services into a joint effort. In summary, there is no particular pattern which leads to OSD initiatives for jointness. The establishment of joint programs through OSD influence is

sporadic, very much dependent upon the influence of individuals, and does not result from a systematic and structured review of all potential joint program opportunities.

3.2.2 The Service Requirements Processes

Each of the Services has established a well-defined process for reviewing emerging operational requirements and translating these requirements into new program starts. These formal review processes allegedly provide for cross-Service review of requirements documents to permit identification of mutual needs which might be best satisfied through joint development efforts. However, the study team found during a review of the actual workings of the Service requirements processes that there is very little cross-Service feedback which could lead to the identification of potential joint program opportunities. Rather, the process of reviewing and validating Service requirements runs almost open-loop with respect to input from other Services. This is depicted schematically in Figure 3.2-1.

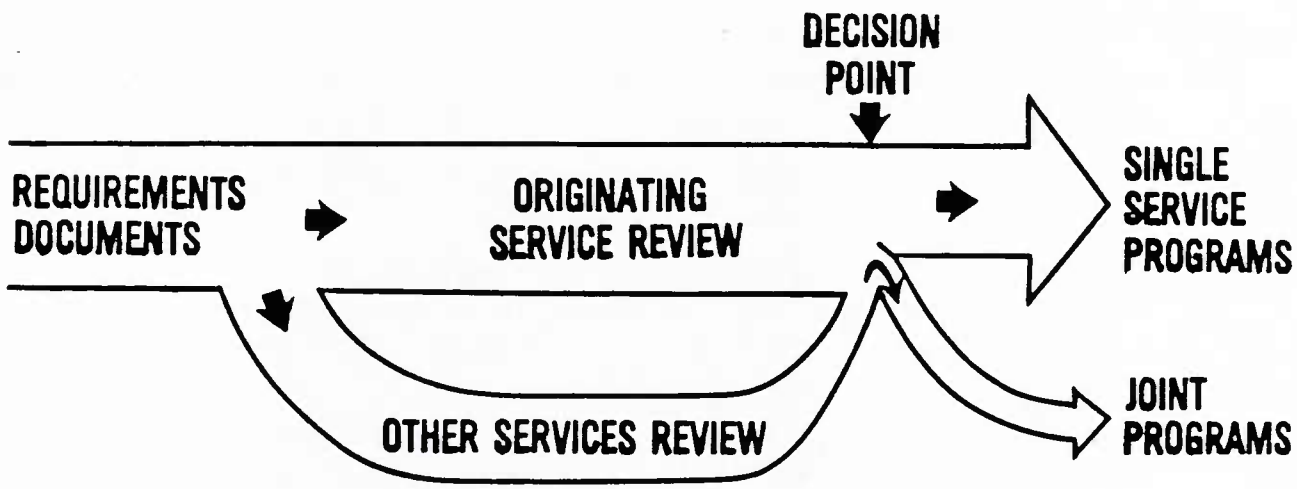

Figure 3.2-1 The Service Requirements Processes

Requirements documents are, in fact, forwarded to other Services for review and comment, but there is no system in place to track the responses of other Services. There is also no system in place to ensure that responses are provided to requirements documents that have been received from other Services. Thus, the requirements review process for each individual Service can proceed without pausing to ensure that the possibility of a joint effort has been thoroughly reviewed and evaluated. In fact, the requirements processes have produced few, if any, joint program suggestions. The review processes are largely single Service oriented and are not structured or motivated to identify joint program opportunities. A fuller discussion of the investigation of the Service requirements processes is presented in Appendix G.

3.2.3 The JLC Panel Structure

Other potential sources of joint program concepts within the Services are the various multi-Service working groups and panels established under the auspices of the Joint Logistics Commanders. A thorough study of the roles of these panels was undertaken by the study team to ascertain how they were functioning with respect to the identification of potential joint program opportunities. A detailed discussion of the results of this study is presented in Appendix F.

The major findings of this investigation were:

- The JLC panels are not specifically chartered to identify joint program opportunities and are, therefore, not doing so
- There are major voids in the coverage of the panels at the commodity, subsystem, and system levels.

Figure 3.2-2 provides a matrix representation of the various system types, or commodities, which might be covered by JLC panels and the joint concerns which might be addressed under each commodity type. The acronymns entered in this matrix represent existing JLC organizations that are addressing various concerns under each commodity type. The voids in the matrix indicate areas where there is no existing organization to evaluate joint concerns or opportunities. However, even in those areas where there is apparent coverage, there is very little emphasis placed on identification of joint program opportunities. Consequently, this extensive joint organizational structure has produced few joint initiatives.

In summary, it is evident that the existing organizational structures within the Services which might be expected to identify opportunities for joint development efforts are not really oriented toward that end. Therefore, it is not surprising that the Services have not had the leading role in initiating joint efforts.

3.3 RATIONALE FOR JOINT PROGRAM SELECTION

In evaluating each of the 80 joint programs in our study sample, we sought to identify the rationale or criteria that were used to justify the selection of a joint effort, in addition to the original source that advocated jointness. We relied primarily on the perceptions of the program managers to provide this information because formal documentation clearly setting forth the rationale for initiation of a joint program was rarely available. In those cases where such documentation did exist, it was used as the primary data source.

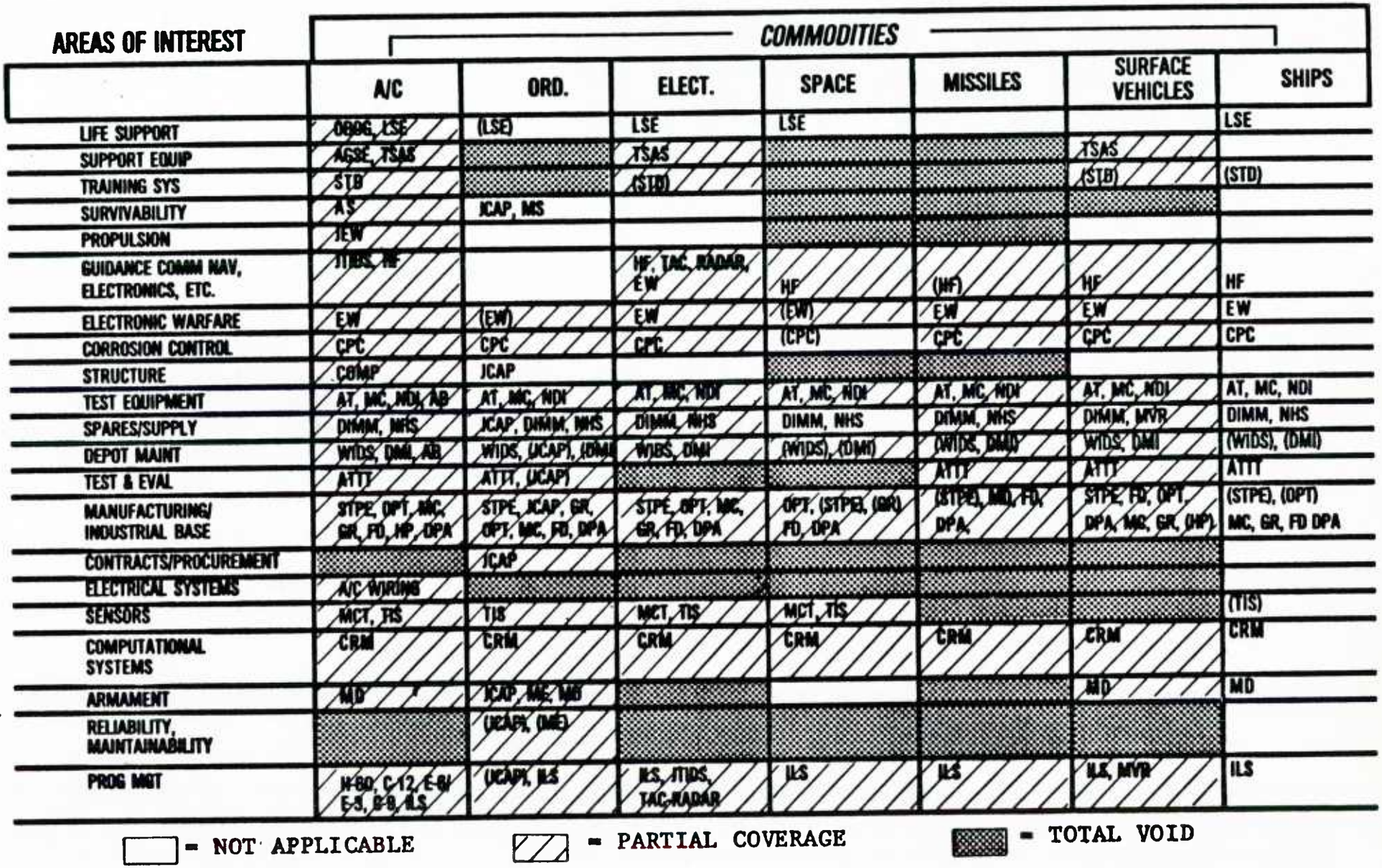

Figure 3.2-2 JLC Panel Structure Matrix

The most dominant rationale for jointness was clearly the achievement of cost savings. This rationale was mentioned in 90 percent of the programs evaluated. The second most important objective was achievement of cross-Service interoperability for systems such as communications and intelligence distribution networks that serve the needs of multiple Services. In most cases where interoperability objectives were cited, the goal of achieving cost savings was also cited. Goals other than cost savings or interoperability were cited for only 7 percent of the programs in the sample. The distribution of the stated jointness rationale for the total sample of 80 programs is presented in Figure 3.3-1.

The study team also asked each program manager if any kind of a cost/benefit analysis had been performed at the time the decision to initiate a joint effort was made. We were specifically seeking cost/benefit analyses which attempted to compare projected costs of parallel single Service efforts to the projected cost of a joint effort. Although several program managers stated that some kind of a cost/benefit analysis had been performed, not one program was able to produce documentation of any kind of comparative cost analysis of joint vs. parallel single Service program strategies. This was particularly surprising in view of the fact that the achievement of cost savings was the sole rationale for jointness for half of the programs and a major rationale for an additional 40 percent. In addition, no program had attempted to document savings actually achieved through jointness.

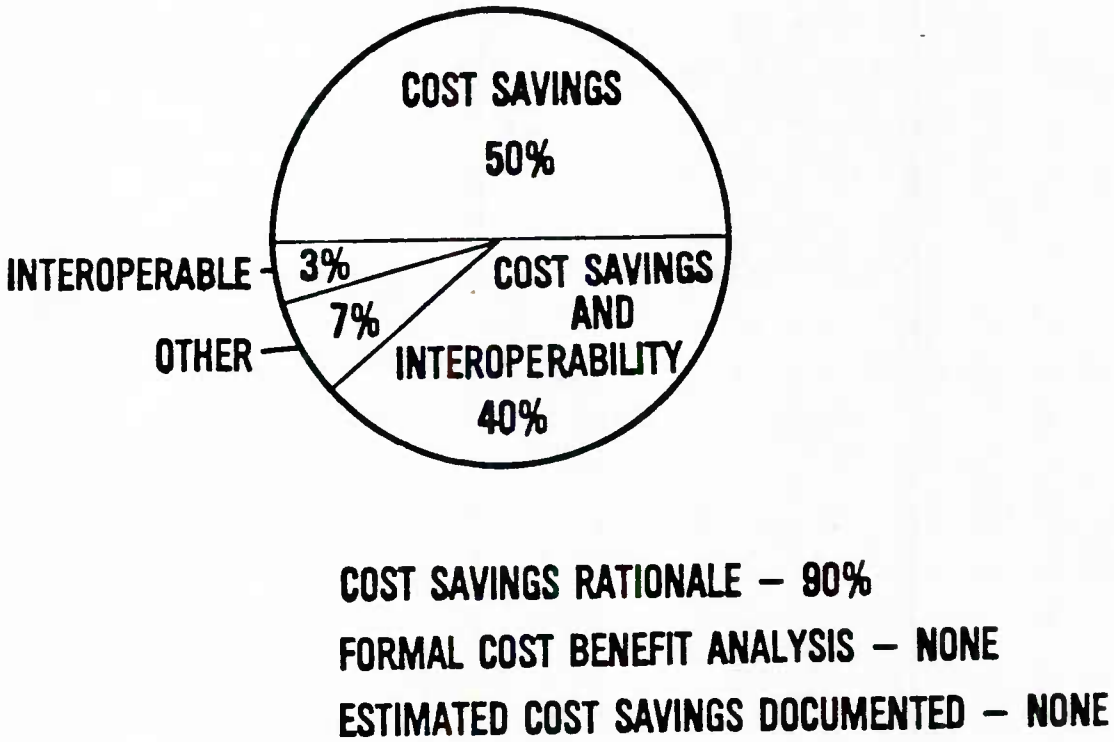

Figure 3.3-1 Rationale for Jointness

3.4 OVERVIEW OF THE CURRENT SELECTION PROCESS

The findings presented in the preceding sections establish several general characteristics of the joint program selection process as it has operated in recent years. These are:

- Dominance of OSD and others external to the Services in initiation of joint programs, particularly the more difficult programs
- Lack of a systematic process for identifying potential joint program opportunities, either within OSD or the Services
- Decisions for jointness based primarily on the potential for cost savings and interoperability, without supporting analysis to identify the real potential for cost savings.

Perhaps the greatest deficiency in the current selection process is that many potentially excellent opportunities for jointness have been completely overlooked. This proposition cannot be proved without extenxive analysis of past and current single service programs, but it is quite likely true given the absence of any systematic procedure for evaluating potential joint opportunities across the program spectrum. Certainly, more thorough review of potential joint program opportunities, particularly by the Services, should be a principal future goal.

A second deficiency in the current selection process is that it has resulted in the initiation of a number of joint programs without adequate preparation or analysis of key potential problems. As a result, these programs have experienced major difficulties in initiation and execution phases.

The nature of these problems is discussed in the following section.

3.5 PROBLEMS OBSERVED IN JOINT PROGRAMS SELECTED BY THE CURRENT PROCESS

The ad hoc nature of the existing joint program selection process has, in many cases, contributed to severe difficulties in the initiation and execution phases. The principal difficulties have been: 1) withdrawal of one or more participating Services after program start, 2) high rates of cost and schedule growth, and 3) disharmony among the participating Services while attempting to resolve critical program issues. The prevalence of these problems has resulted, in many instances, in the loss of the potential benefits of jointness.

3.5.1 Participating Service Withdrawals

Withdrawal of one or more participating Services occurred in a signficiant proportion of the 80 joint programs examined in this study. Thirteen percent of all joint programs studied had experienced a withdrawal by one or more Services. This number is particularly impressive because approximately half of the sample programs are still in the development phase, and may experience additional withdrawals as they progress toward production.

Figure 3.5-1 reveals that withdrawals are especially prevalent among programs originated by OSD or other sources external to the Services. Approximately 20 percent of all programs originated by OSD experienced withdrawals, whereas

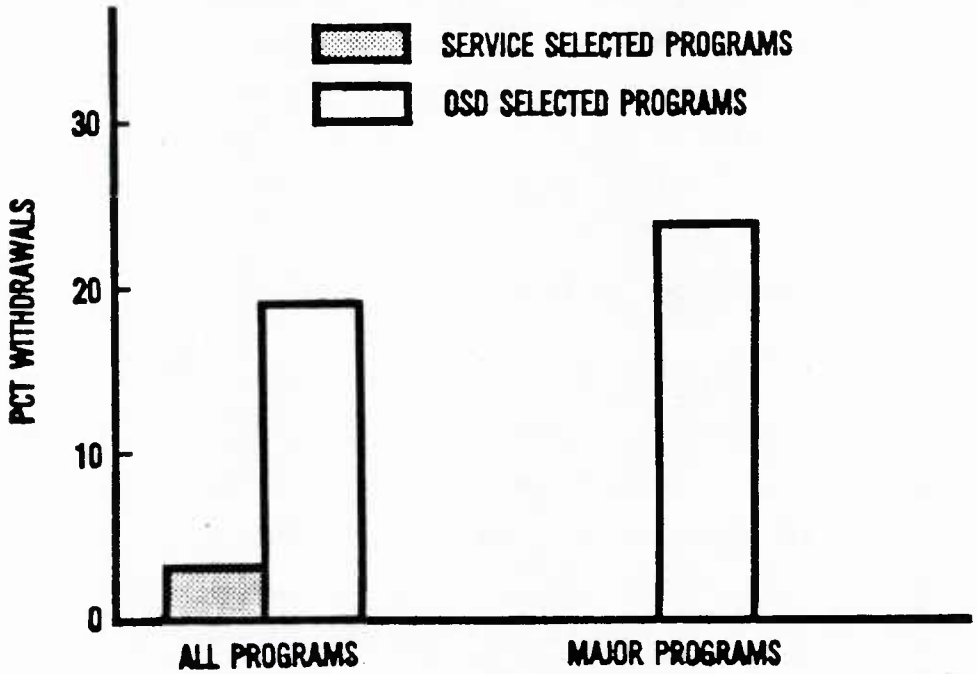

Figure 3.5-1 Withdrawals from Joint Programs

only 4 percent of programs originated by the Services experienced a withdrawal. In major programs the contrast is even more dramatic. About 25 percent of major programs originated by OSD experienced a withdrawal, whereas no major program originated by the Services experienced a withdrawal.

This finding is not surprising in light of the fact that OSD has initiated most of the major programs as well as most of the difficult programs, i.e., those that have had the greatest technical requirements dissimilarities. However, it does emphasize the fact that the selection of a difficult joint program does not always lead to successful program initiation and execution. The reasons most often cited for withdrawal of participating Services were technical requirements differences (60 percent), a combination of technical requirements and cost

problems (20 percent), and low participating Service priorities for the program (20 percent). All of these problems might have been identified during the selection process if more thorough and systematic decisionmaking procedures had been in place. A clear need exists to establish such procedures so that these critical issues can be adequately addressed prior to a joint commitment.

3.5.2 Cost and Schedule Growth Problems

Joint programs that survive the initiation and execution phases experience particularly severe cost and schedule growth problems. To establish a basis for evaluating the severity of these problems, cost and schedule growth rates were computed for a sample of 16 major joint programs and 36 major single Service programs. These rates were derived from data presented in Selected Acquisition Reports in order to ensure the greatest possible degree of consistency and comparability. The results of these computations, for both the single Service programs and the joint programs are presented in Figure 3.5-2.

The height of the bars in Figure 3.5-2 represent the average cost and schedule growth rates for the two program samples. In every case, the average joint program growth rates were significantly higher than the single Service growth rates. In the case of R&D cost growth rates, the joint program rate was 3.5 times the single Service rate. Admittedly, the comparative rates for single Service and joint programs will vary, depending upon the particular sample of programs selected for analysis. However, the differences in this particular sample are significant enough to suggest that joint programs, on average, experience substantially greater cost and schedule growth problems than single Service programs.

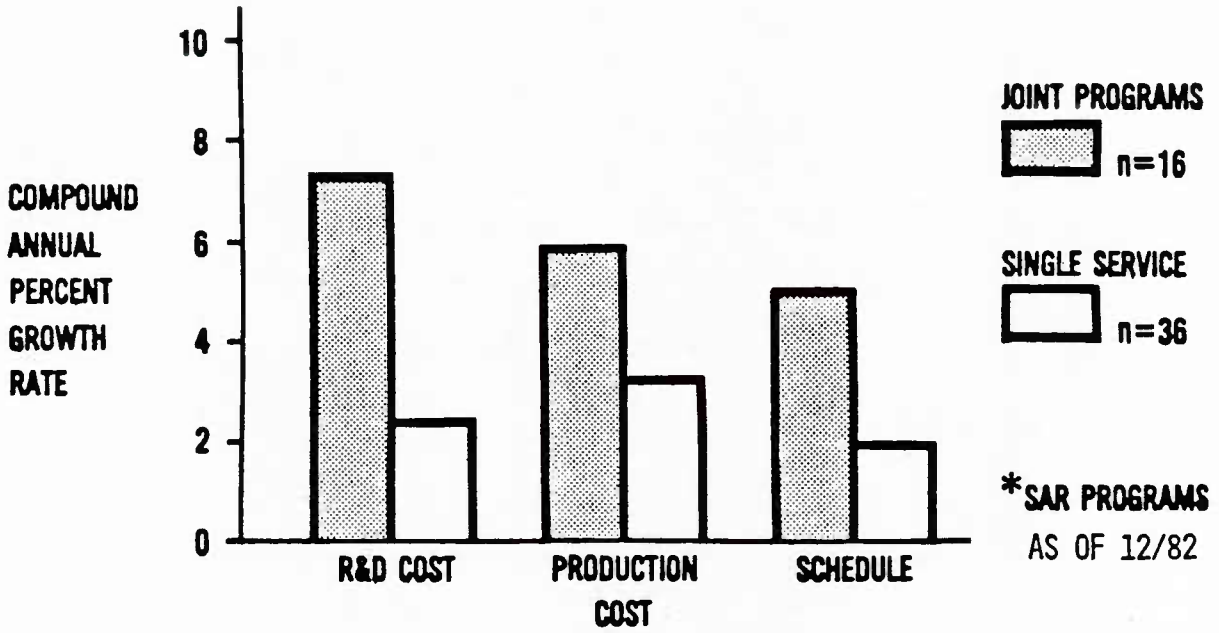

Figure 3.5-2 Comparative Cost and Schedule Growth Rates

The impact of these higher growth rates over time is potentially significant. A 7 percent compounded annual growth rate, the approximate average joint program R&D cost growth rate, can lead to an 80 percent growth in estimated cost over a period of eight years. In contrast, a 2 percent annual growth rate, such as that observed for single Service R&D costs, would yield only about a 20 percent increase in estimated program cost over the same period. It should be emphasized that these cost growth rates are expressed in constant, program base-year dollars. The effects of inflation compound this growth in actual then-year program costs. The effects of

these comparative cost growth rates in base-year dollars are presented in Figure 3.5-3.

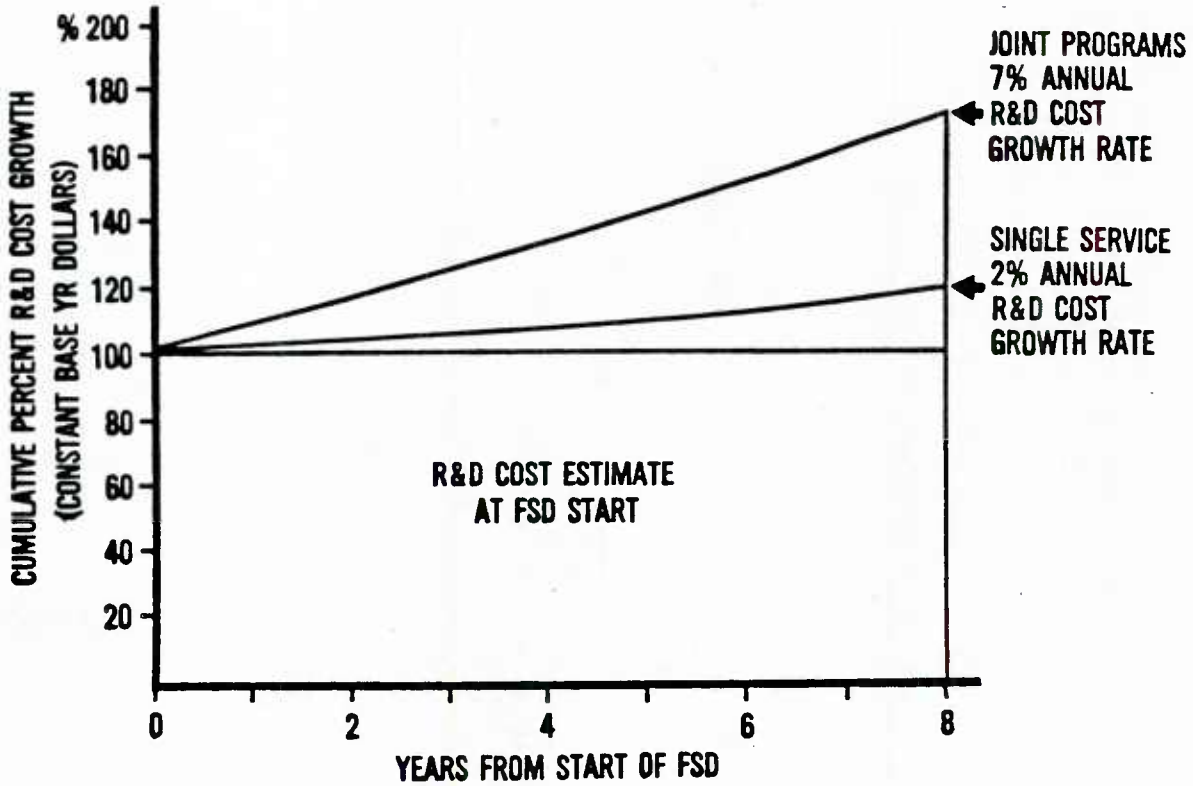

Figure 3.5-3 Impact of Alternative Cost Growth Rates

The problem of higher joint program R&D cost growth rates is further compounded by the higher rate of R&D schedule slippage experienced by joint programs. Longer R&D schedules (FSD start to IOC) extend the period during which the compound R&D cost growth rate can affect program cost. Clearly the alleged cost benefits of joint programs can be quickly lost if they experience cost and schedule growth rates of this magnitude.

It is important to note that the comparative cost and schedule growth rate figures presented in Figure 3.5-2 are

averages for the respective joint and single Service samples. These numbers do not imply that all joint programs fare more poorly than single Service programs in controlling cost and schedule growth. The average values for the joint program sample are, in fact, pulled up by a relatively small number of programs with severe cost and schedule growth problems. If joint program selection and execution procedures can be improved to eliminate these problem programs, the relative performance of joint programs will compare favorably with single Service programs.

The severe problem which is evident in comparative R&D cost and schedule growth rates is also reflected in the growth of production costs. The average production cost growth rate for the 16 major joint programs examined was approximately 6 percent per year. The average production cost growth rate for the 36 major single Service programs was about 3 percent per year, as indicated in Figure 3.5-2. This 2-to-1 ratio in average cost growth rates can have an impact on total program costs even more severe than the impact of R&D cost growth because production expenditures are generally substantially larger than R&D expenditures.

We were not able to measure the relative rates of growth in operation and support costs for joint and single Service programs, because that data was not available for the programs studied. Despite this lack of data, it is reasonable to project that the increases in production costs would be reflected in the costs of initial and replenishment spares. Therefore joint program O&S cost savings are likely to be eroded, just as R&D and production cost savings are eroded, by higher joint program cost growth rates.

It is not clear from the analysis of comparative cost and schedule growth rates whether the potential net life-cycle cost benefits of jointness are being totally lost in a significant number of joint programs. Any conclusion about net savings would require a detailed comparison of projected joint costs with alternative hypothetical costs of two parallel single Service programs. Despite the absence of such direct comparative analyses, the comparative growth rates identified in this study suggest that many joint programs may not be producing significant net savings. The realization of the potential for savings from joint programs in the future will require that the causes of these comparatively high cost and schedule growth rates be eliminated.

3.6 SOURCES OF COST AND SCHEDULE GROWTH PROBLEMS

Substantial analytical effort was devoted to isolating the program factors most closely associated with high cost and schedule growth rates in joint programs. Two principal factors emerged as those most consistently correlated with cost and schedule growth problems. These were program funding turbulence and technical requirements resolution problems.

3.6.1 Funding Turbulence and Technical Requirements Problems

Funding turbulence and technical performance requirements resolution problems were related to each other as well as to cost and schedule growth problems. When one of these problems was present the other was also likely to be present. This relationship is illustrated in Figure 3.6-1.

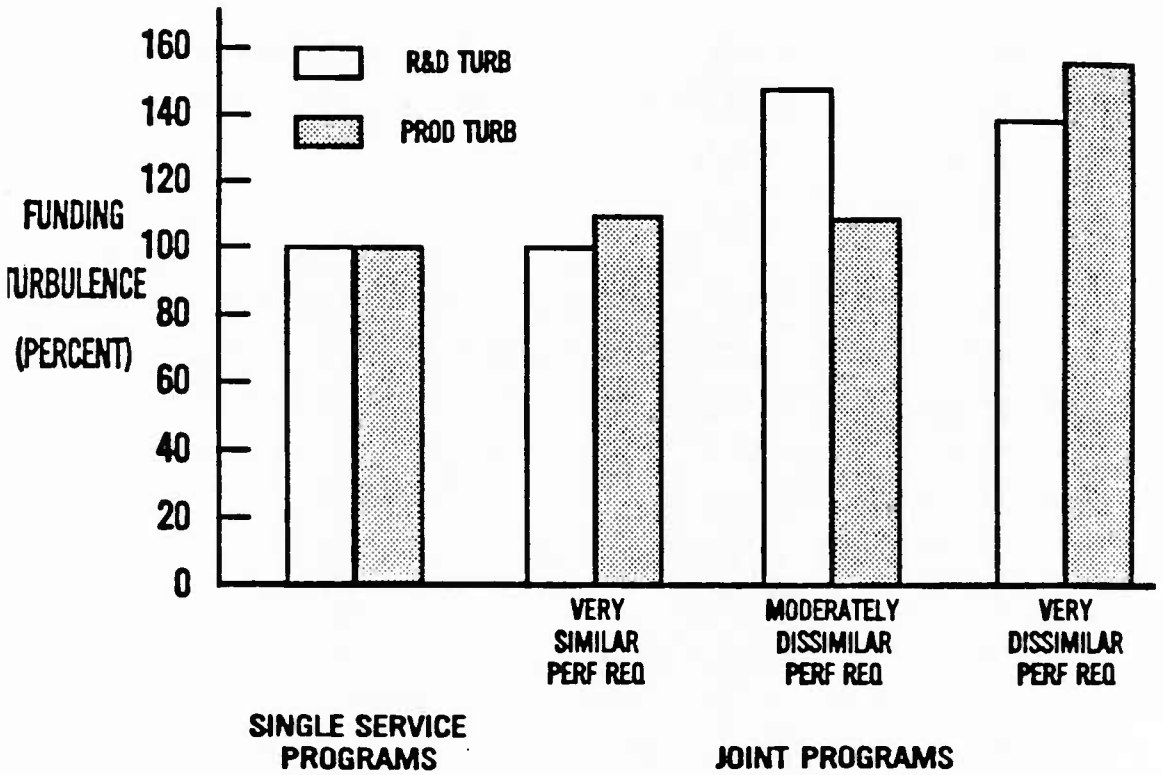

Figure 3.6-1 Funding Turbulence vs. Technical Requirements Similarity

In Figure 3.6-1, the height of the bars represents the average degree of funding turbulence in R&D and production experienced by a sample of single Service programs and three separate sets of joint programs. (The technique employed for measuring funding turbulence is described in detail in Appendix B.) The average funding turbulence values for single Service programs have been normalized to 100. The first subset of joint programs, represented by the leftmost set of bars, consists of those with the highest degree of technical requirements similarity among the participating Services. (Computation of the technical requirements similarity rating used to make this classification is also described in detail in Appendix C.) This set of programs experienced funding turbulence levels comparable to single Service programs. The middle set of bars represents funding turbulence among joint

programs with a moderate degree of technical requirements similarity, and the rightmost set represents funding turbulence among programs with a very low degree of technical requirements similarity.

The general upward trend of the heights of these bars suggests that funding turbulence increases as technical requirements similarity decreases. This finding is not surprising; it is reasonable to expect that problems in resolving technical requirements issues can lead to reduced funding support by joint program participants. The importance of this observation lies in the fact that both of these problems are associated, in turn, with program cost and schedule growth. The mutual interdependence of these problems is represented schematically in Figure 3.6-2.

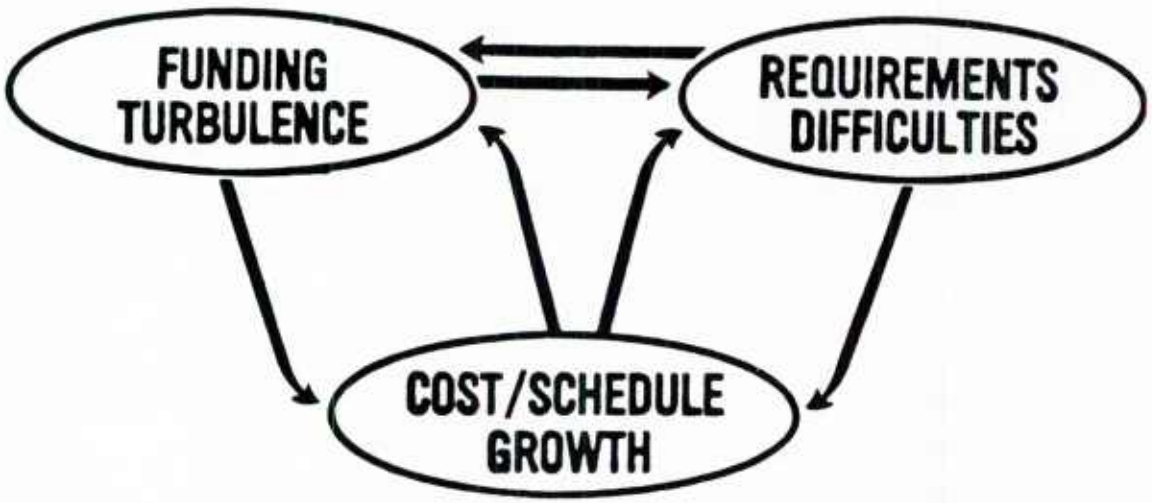

Figure 3.6-2 Problem Interrelationships

The arrows in this figure represent a complex set of interrelationships. We have noted that funding turbulence and requirements difficulties seem mutually interdependent. Both of these factors appear to affect cost and schedule growth, as will be shown in the following section. It is likely that cost and schedule growth, in turn, will affect the funding profile of a program and cause some modification in technical goals. This cycle of problems emphasizes the importance of resolving technical requirements and funding commitment issues prior to joint program initiation.

3.6.2 The Relationship of Funding Turbulence and Technical Requirements Problems to Cost and Schedule Growth

Several techniques were employed to establish the relationship of key factors to cost and schedule growth problems, including statistical correlation analysis. The results of this analysis indicate a highly significant relationship between funding turbulence, technical requirements problems, and cost and schedule growth. The results of the correlation analysis are discussed fully in Appendix D.

Another technique employed was to observe differences between average factor values for the top quartile of most successful programs (i.e., those with the lowest cost and schedule growth rates) and average factor values for the bottom quartile of least successful programs (i.e., those with the highest cost and schedule growth rates). Using this technique, we discovered that funding turbulence and technical requirements resolution problems were consistently more severe in those programs experiencing high cost and schedule growth rates. These results are presented graphically in Figures 3.6-3 and 3.6-4.

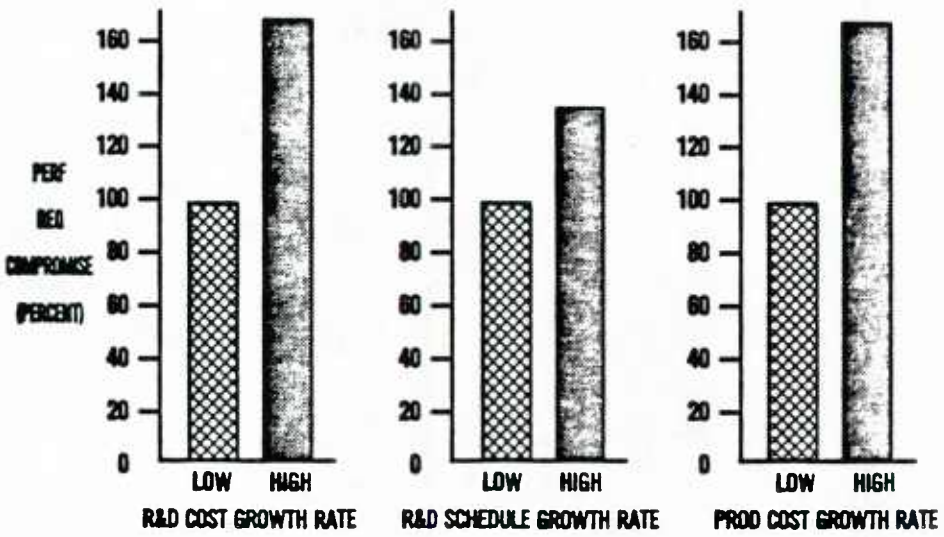

Figure 3.6-3 Requirements Compromise vs. Cost and Schedule Growth

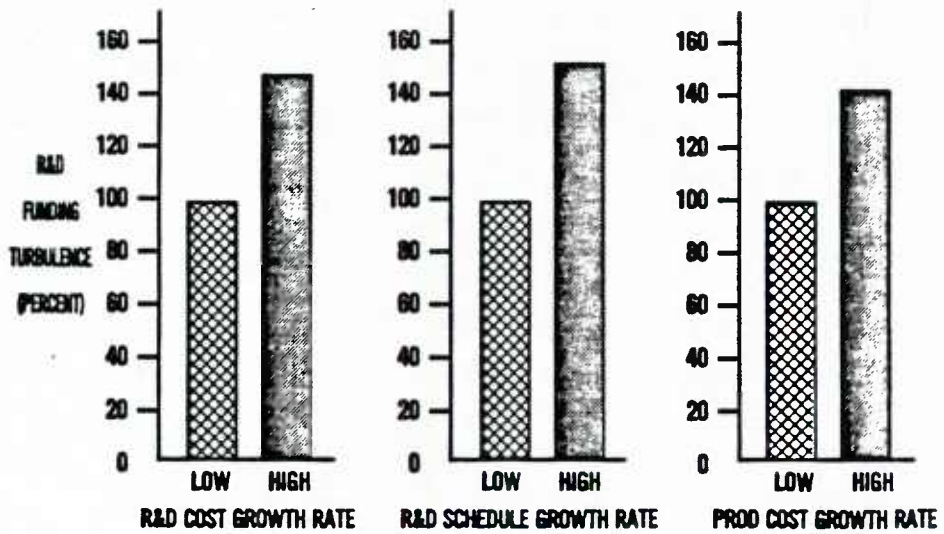

Figure 3.6-4 Funding Turbulence vs. Cost and Schedule Growth

The height of the bars in Figure 3.6-3 represents the average degree of technical requirements compromise necessary in the top and bottom quartiles of joint programs for each of three success measures. The average technical requirements compromise rating for the top quartile (low growth rates) has been normaized to 100 in each case. (The technical requirements compromise index is described in Appendix C.) The average degree of technical requirements compromise was significantly higher for the bottom quartile of programs experiencing the highest rates of cost and schedule growth. This demonstrates the relationship between technical requirements resolution difficulties and cost and schedule growth problems.

Similarly, the heights of the bars in Figure 3.6-4 represent the average level of R&D funding turbulence in the top and bottom quartiles of joint programs for the same three success measures. As in the previous chart, the average funding turbulence rating for the top quartile has been normalized to 100. Once again, there is a consistent pattern of higher funding turbulence for the programs experiencing the highest rates of cost and schedule growth. Which problem occurred first is not always clear. In some instances cost and schedule growth induced funding turbulence. In other cases the opposite was true. In any case, the interrelationship of the two problems is demonstrated by this data.

3.6.3 Summary of Joint Program Selection Problems

The preceding sections demonstrate that some joint programs experience major problems, including:

- High rates of participating Service withdrawals, particularly for externally initiated programs

- High rates of cost and schedule growth, particularly for programs with technical requirements resolution difficulties or high funding turbulence.

The following section recommends improvements to the joint program selection process that might reduce the incidence of these problems in future joint programs.

3.7 RECOMMENDATIONS TO IMPROVE JOINT PROGRAM SELECTION

Any improvements in the joint program selection process must address the fundamental problems identified in Sections 3.1 through 3.6. We have noted that the existing process is ad hoc rather than systematic. Therefore, many potentially beneficial joint program opportunities have probably been overlooked. The selection process is also dominated by OSD rather than the Services. This has led to the selection of many difficult joint programs which have subsequently experienced Service withdrawals, funding turbulence, or technical requirements resolution difficulties. In some cases, these problems have, in turn, contributed to severe cost and schedule growth problems. As noted in Figure 3.7-1, the ad hoc nature of the existing joint program selection process contributes to the creation of joint programs that ultimately experience severe problems in initiation and execution. Clearly a need exists for a more active and systematic selection and commitment process.

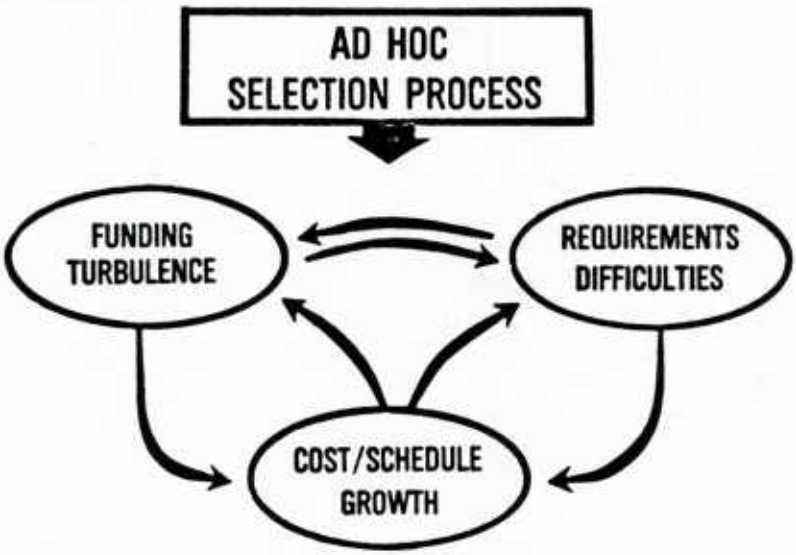

Figure 3.7-1 Results of the Current Selection Process

3.7.1 Identification of Candidates for Jointness

Many of the problems in selecting joint programs recognized by the 1983 Defense Science Board Summer Study Briefing Report on Joint Service Acquisition Programs have been noted here. A principal recommendation of this DSB study was the creation of a Joint Requirements Management Board (JRMB) to identify, evaluate, and select candidates for joint development and acquisition programs. That recommendation has been acted upon by the Joint Chiefs of Staff, and a charter for the JRMB has been approved.

The JRMB charter authorizes the JRMB to perform six basic tasks. These are:

- Examine military requirements for potential joint solutions

- Seek opportunities for joint development and acquisition by soliciting recommendations for joint programs and chartering study groups to identify joint concepts, requirements, and issues

- Evaluate potential joint acquisition programs

- Select potential candidates for jointness and recommend these candidates to the Military Department Secretaries

- Provide documentation to establish the mission need determination required to initiate joint programs

- Provide oversight of management and requirements issues during the entire acquisition process for joint programs.

The creation of the JRMB will potentially resolve many of the deficiencies in the joint program selection process which have been identified in the preceding sections of this chapter. The membership of the JRMB, which will consist of the Vice Chiefs of the four military Services and the Director of the Joint Staff, will provide high-level Service involvement in the review of potential joint opportunities and in the management of joint programs which are ultimately initiated. This review should be systematic, rather than ad hoc, and may restore the initiative to the Services in the selection of most joint programs. Furthermore, the JRMB may forestall many ill-advised joint efforts which are advocated by others by developing a consistent, well-defined Service rationale for, or against, jointness in each individual case reviewed by the board.

The potential of the JRMB to provide for systematic review and selection of joint opportunities by the Services is clear. Therefore, the JRMB concept is fully supported by this

study. The study team and advisory group have developed a number of specific recommendations which are intended to assist the JRMB in executing its assigned tasks effectively.

JRMB Review Process - In the course of this study, many have noted the historical reluctance of the Services to become involved in joint programs. Considerable scepticism exists about the ability, or motivation, of the JRMB to change the traditional Service attitudes toward jointness. This theme was expressed repeatedly during study team interviews with high-level Service and OSD managers. If the JRMB fails to pursue its mission aggressively, no substantive change can be expected in the current process of joint program selection.

In order to ensure that the JRMB is actively involved in evaluating all significant opportunities for jointness, the study team recommends that the JRMB be required to certify that all major program new starts have been evaluated for potential jointness. The JRMB should provide the results of this evaluation, including a clear rationale supporting a recommendation for, or against, jointness to the Service Secretaries. The implementation of such a requirement would ensure that no major program new start is initiated without having been assessed against the requirements and plans of all Services. It would also ensure that a clear rationale is formally presented by the Services to support a decision for or against jointness. This rationale would serve to make the Service position clear to others, including OSD and Congress, who might be strong advocates or opponents of jointness.

The Role of the JLC - The JRMB is to solicit recommendations for potential joint programs from many sources, including OSD, the Services, commanders of unified and specified commands, Defense agencies, the Office of the Joint

Chiefs of Staff, and others. The development and acquisition commands headed by the Joint Logistics Commanders are potentially major sources of joint program concepts. It has been noted, however, that the existing JLC panel structure is not functioning effectively in identification of joint program opportunities. In order to correct this deficiency, the study team recommends that the JLC create special panels of subordinate commanders to review potential opportunities for jointness within their respective areas of program responsibility.

The study group has identified six representative subordinate commander panels which would provide substantial coverage of the spectrum of potential joint program opportunities. The six suggested panels are oriented to major categories of system type, as indicated in Figure 3.7-2.

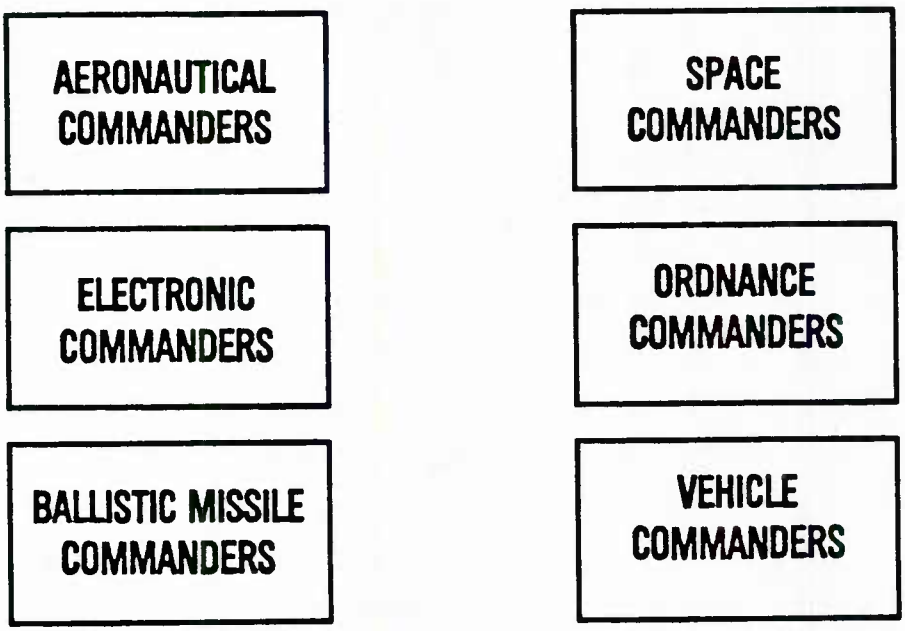

Figure 3.7-2 Recommended Subordinate JLC Commander Groups

The members of each of these panels would be the appropriate system command commanders within each of the Services. For example, membership on the Aeronautical Commanders' Panel would consist of a representative from each of the acquisition/logistics commands with primary responsibility for aviation systems. The following panel membership would be appropriate:

- DARCOM: Commander, U.S. Army Aviation Systems Command
- NavMat: Commander, Naval Air Systems Command
- AFLC: Vice Commander, Air Force Logistics Command
- AFSC: Commander, Aeronautical Systems Division.

The charters of these panels would emphasize the tasks of identifying potential joint opportunities within the broad areas of responsibility of the participating commanders, and ensuring maximum coordination of research and development programs to avoid unnecessary duplication of effort. The panels should meet periodically, perhaps semi-annually, to carry out their assigned tasks and should report annually to the JLC on progress achieved. Suggested membership on the panels and a proposed draft charter are included in Appendix F.

The subordinate commanders within the development and acquisition community are uniquely qualified to identify potential joint opportunities because they manage new and emerging technology development efforts. The input from these panels to the JRMB, through the JLC, would complement the input which is generated by operational commanders, Service

staffs, and others. The active participation of the R&D and acquisition community in the joint program identification process would supplement the efforts of the other sources of joint program ideas, particularly in the area of non-major systems and subsystems, and complete a multi-faceted structure for identifying new joint concepts, as indicated in Figure 3.7-3.

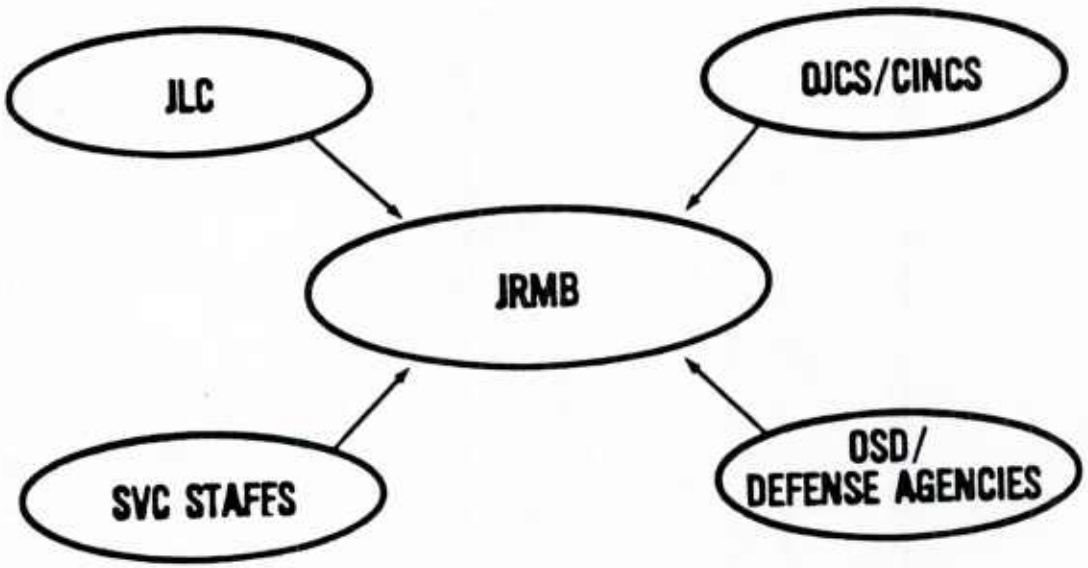

Figure 3.7-3 Organizations Identifying Potential Joint Programs

A major potential concern of the JLC staffs in implementing this recommendation is the prospective demand on already overstressed staff manpower resources. This is a very real and practical concern. However, the basic concept, as envisoned by the study group, would not require addition of dedicated support staff for the panels. The existing subordinate commander staff organizations should be able to identify agenda items for the group meetings based on staff communications with respect to proposed program new starts. The scope

of the staffing may be constrained by setting dollar thresholds on programs to be reviewed. In summary, the projected staff burden should not be excessive and it can be controlled by setting limits on the number of the issues which the subordinate commanders can reasonably be expected to address. These limits will have to be developed in practice for each of the subordinate commander groups individually.

These groups are also not intended to bypass the normal Service requirements processes or to usurp the roles of the requirements communities. There would be active dialog between the subordinate commander groups and the user and requirements communities about prospects for potential joint program candidates before any recommendation went forward to the JLC or JRMB. These groups are intended to provide new perspectives on joint program opportunities from within the acquisition communities. They should supplement the efforts of the requirements communities and support them.

The systematic and thorough identification of potential joint program opportunities by the Services is only one of the improvements needed in the current selection process. The second improvement needed is the application of consistent and meaningful selection criteria in evaluating the potential opportunities which are identified.

3.7.2 The Selection Criteria and Decision Process

In previous sections, we noted that many joint programs have been initiated without resolution of key requirements issues and without firm commitment by the participating Services. In addition, the rationale for jointness, which is usually achievement of cost savings, is rarely supported by detailed analysis which supports the viability of the basic

rationale. We have also noted that, under these conditions, many joint programs subsequently encounter requirements resolution problems, funding turbulence, cost and schedule growth, and participating Service withdrawals. Clearly, the selection decisionmaking process must be structured so that these pervasive problems are avoided in future joint programs.

The Study Group has developed a simple conceptual scheme which ought to be followed in evaluating future joint program opportunities. This decisionmaking scheme is presented in the form of a flow diagram in Figure 3.7-4.

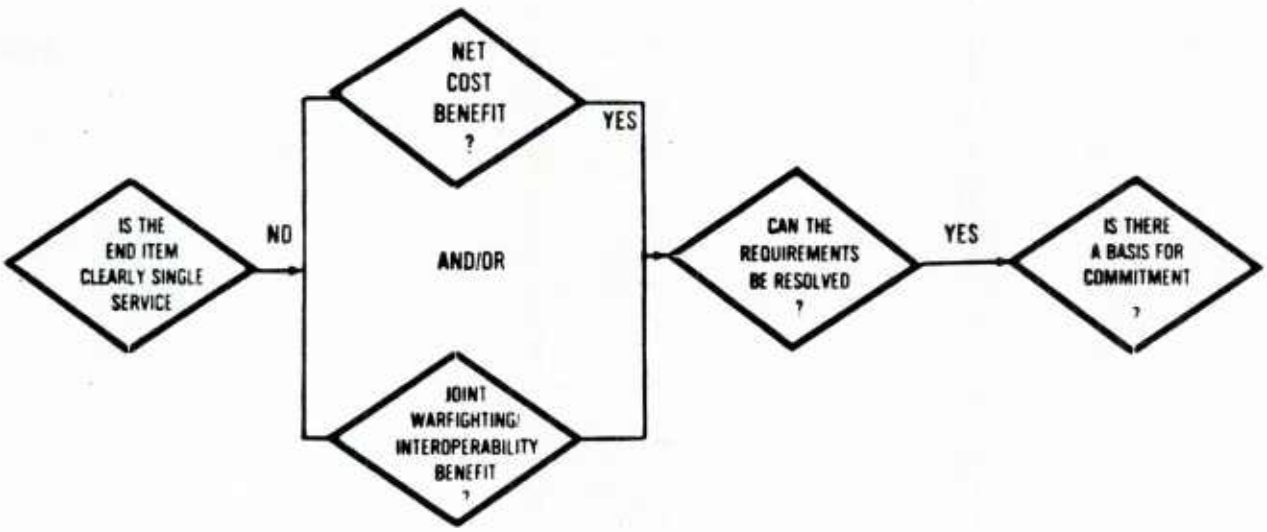

Figure 3.7-4 Recommended Selection Criteria and Decision Process

The selection criteria displayed in Figure 3.7-4 have been chosen to ensure that all of the major issues that might affect joint program success are addressed before a commitment is made to initiate a joint program. These major issues have been defined by the problems (discussed in preceding sections) that have emerged in current joint programs.

The first question that should be addressed is whether the system being considered is intended to meet a mission need which is clearly single Service. In the future, the burden of proof should be placed on the Services to demonstrate that a need is uniquely single Service. In the past, the burden of proof has fallen on the advocates of jointness to demonstrate that a joint solution to similar mission needs was potentially superior to separate single Service programs. This is a subtle, but important shift in emphasis. It is a shift which is needed in order for the Services to respond to emerging Congressional concerns as well as to maximize the effective use of limited R&D and procurement resources.

If the mission need is not clearly unique to one Service, the potential benefits of a joint effort should then be carefully evaluated. We have noted previously that net cost savings have been cited as a primary rationale for jointness in more than 90 percent of the joint programs examined in this study. However, analysis of the comparative costs of joint and parallel single Service efforts have rarely, if ever, been completed. If a strong case for jointness is to be made, an analysis of this type, however rudimentary, ought to be completed. Such an analysis is admittedly difficult because of the many uncertainties that exist before a program is initiated. Nevertheless, rough parametric cost estimates can be completed, providing some useful insight into the rough magnitude of the potential cost savings that might be realized through jointness. Such analyses, if completed, might also indicate that the potential savings in many cases are not sufficient to justify joint efforts.

Another prominant rationale for jointness has been the achievement of joint warfighting capability and interoperability of systems and subsystems between multiple Services.

This type of rationale often was cited in conjunction with cost savings as the basis for initiation of joint programs. The purpose and net operational benefit of a joint/ interoperable capability should be clearly defined before proceeding with a joint program. Often this benefit will be in addition to the achievement of net cost savings through jointness. In any case, the potential benefits of jointness must be clearly defined and analyzed before a joint program is initiated.

If a clear rationale for a joint program exists, an effort should be made to examine the respective requirements of the potential participating Services in order to resolve any major differences before program initiation. The impact of unresolved requirements differences has been discussed at length in preceding sections. The dissolution of many joint programs can be traced directly to inadequate resolution of requirements issues at the onset of a joint program. The apparent schedule growth and cost growth associated with joint programs experiencing requirements resolution difficulties have also been demonstrated. If these issues cannot be satisfactorily resolved, it is not likely that a joint program will succeed, and therefore, a joint program should not be initiated.

Although these are clearly the major issues which must be addressed in the selection of joint programs, they are not all the issues which are relevant to the decision to choose jointness. Other issues which were identified by the study team were such things as:

- Compatibility of needs with respect to timing of system acquisition and deployment
- Compatible priorities to ensure sustained support by all Services

- Affordability of the system within the total budget structure for all participants.

These and other factors will also have to be considered by decisionmakers who are charged with selection of joint programs. There are no practical means to define absolute guidelines for weighing all these considerations, and decisionmakers would be unlikely to adhere to such guidelines in any case. It is important, however, that each case which is evaluated for jointness be reviewed carefully with respect to the basic issues which we have identified. Other considerations will weigh in the decision in many cases, but the core issues are relevant in all cases.

The final major screening hurdle that should be crossed before joint program initiation is an assessment of the degree of Service commitment in support of the joint effort. It has been noted that many joint programs were initiated by sources outside the Services. In some instances these programs have enjoyed only minimal support by the participating Services. As a result, these programs experienced a very high incidence of participating Service withdrawals and very high funding turbulence in the execution phase. A forced marriage is not always a successful one, and this fact should be recognized by joint program advocates.

3.7.3 Prerequisites to Commitment

In order to establish a sufficient basis for participating Service commitment to a joint program, technical, organizational, and funding issues need to be formally agreed upon. These agreements should be embodied in three doucuments:

- Joint Statement of Operational Requirement (JSOR)
- Memorandum of Agreement
- Projected Program Funding Profile.

In many instances in the past, the negotiation of these issues and completion of these agreements was neglected or left to the Joint Program Manager. This practice has led to many instances of program instability and turmoil.

The JSOR provides the definition of requirements necessary to ensure that no major requirements issues remain unresolved. The Memorandum of Agreement should clearly define the respective roles of the participating Services and a projected program schedule, along with other pertinent program details. The projected Program Funding Profile represents a commitment by the prospective participating Services to pursue funding for the program at a specified level over time. Although this document cannot be binding, it provides a basis for improved funding stability.

Once these basic documents have been prepared, a recommendation should go forward from the JRMB to the participating Service Secretaries for signature and approval. Such high-level approval should reinforce the degree of commitment to a joint effort by all participants. This initial commitment should, in turn, help to sustain a stable and successful joint program.

It should be noted that this initial commitment is only the first step in a three-step process of commitment recommended by this study. This step is taken at program inception, as indicated in Figure 3.7-5. Two additional steps

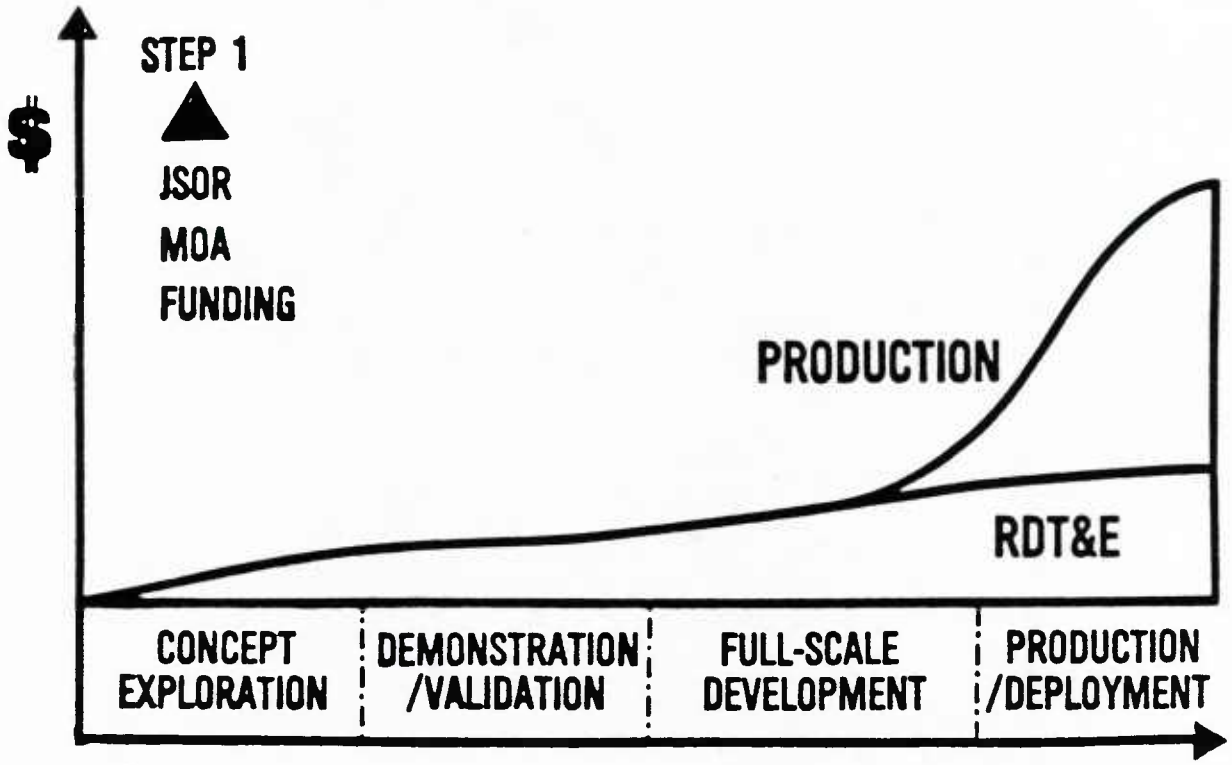

Figure 3.7-5 Commitment Step One

should be taken at later program milestones. These steps will be discussed in Chapters Four and Five.

This chapter identified current practices prevalent in the selection of joint programs, problems that have emerged in many joint programs because of deficiencies in those practices, and potential changes to the selection process that might correct those deficiencies. The next chapter addresses the practices and problems observed in the initiation of joint programs and recommends some changes in these practices as well.

4. INITIATION OF JOINT PROGRAMS

Of the 80 joint programs the study team examined, 33 were designated major programs and 47 non-major. Any discussion of the specifics of initiating joint programs needs to take into account some fundamental differences between major and non-major programs. For this reason, the discussion in Chapter 4, where appropriate, will be divided into major and non-major program subsections.

4.1 CURRENT PRACTICES

4.1.1 Current Practices -- Major Programs

Major programs make up 41 percent of the programs studied. Most (73 percent) were programs with Joint Program Offices (JPOs) with staff presence from the participating Services. Just over a third (37 percent) of the programs were in development in December 1983 when the program office visits were started. The remainder (63 percent) were in production, deployed, or historical. An interesting fact was uncovered during the study that runs counter to the many previous reports and perceptions that joint programs are selected late in the acquisition cycle. The data base shows that 86 percent of major programs were designated joint when they were in R&D and 63 percent were made joint during pre-FSD. Figure 4.1-1 illustrates these points.

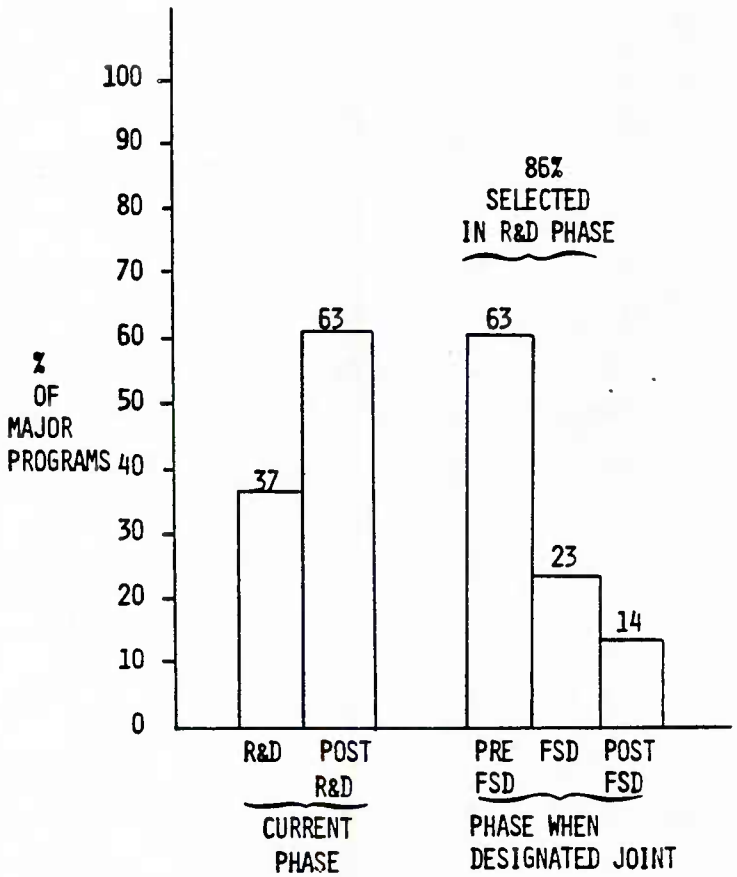

Figure 4.1-1 Acquisition Phase of Major Programs

An important distinguishing feature of major joint programs is that they tend to be high priority and receive a great deal of "help" from all levels. This is shown in Figure 4.1-2. For instance, 93 percent of the lead Services and 85 percent of the participating Services had a formal, documented need for the equipment that the program was to acquire. This compares to 83 percent and 69 percent respectively for all programs. Additionally, the priorities on these programs were in the Services' top third for 72 percent of the lead Services and 48 of the participating Services. This compares to 47 percent and 36 percent respectively for all programs. Congress and OSD directed jointness on 71 percent of the major programs compared to 63 percent of all programs.

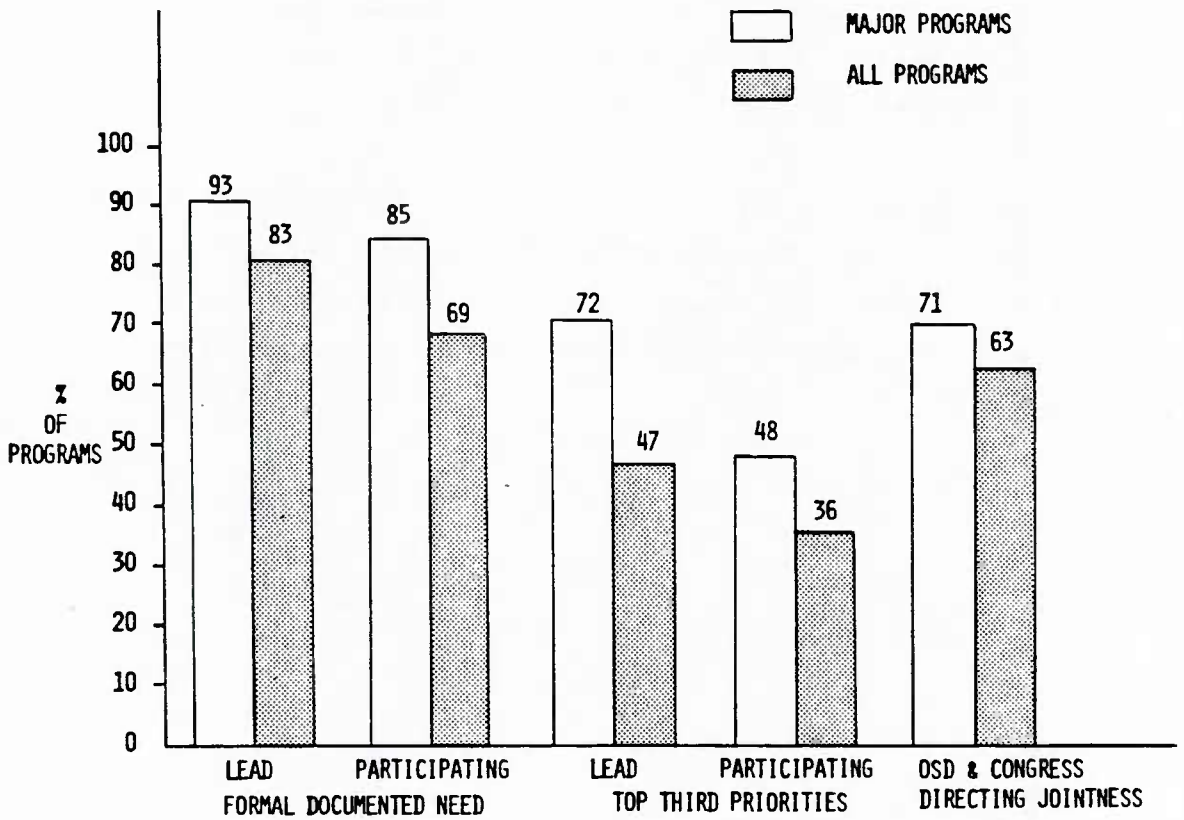

Figure 4.1-2 Current Practices on Major Programs

In summary, major joint programs were found to have several significant and distinctive characteristics in comparison to non-major programs.

- They were more likely to have a formal requirement document prior to going joint
- They enjoyed higher service priority than non-major programs
- They were more often originated by Congress or OSD.

Current practices in three key areas affecting the initiation of both major and non-major programs were examined during the study. These areas were organization, staffing, and execution of charters and agreements. Each of these areas is discussed spearately for major programs in this section and for non-major programs in the following section.

Organization - The predominant (73 percent) method of managing major programs was with a jointly manned program office as is shown in Figure 4.1-3. Definitions of the different organizational types are contained in Appendix B.

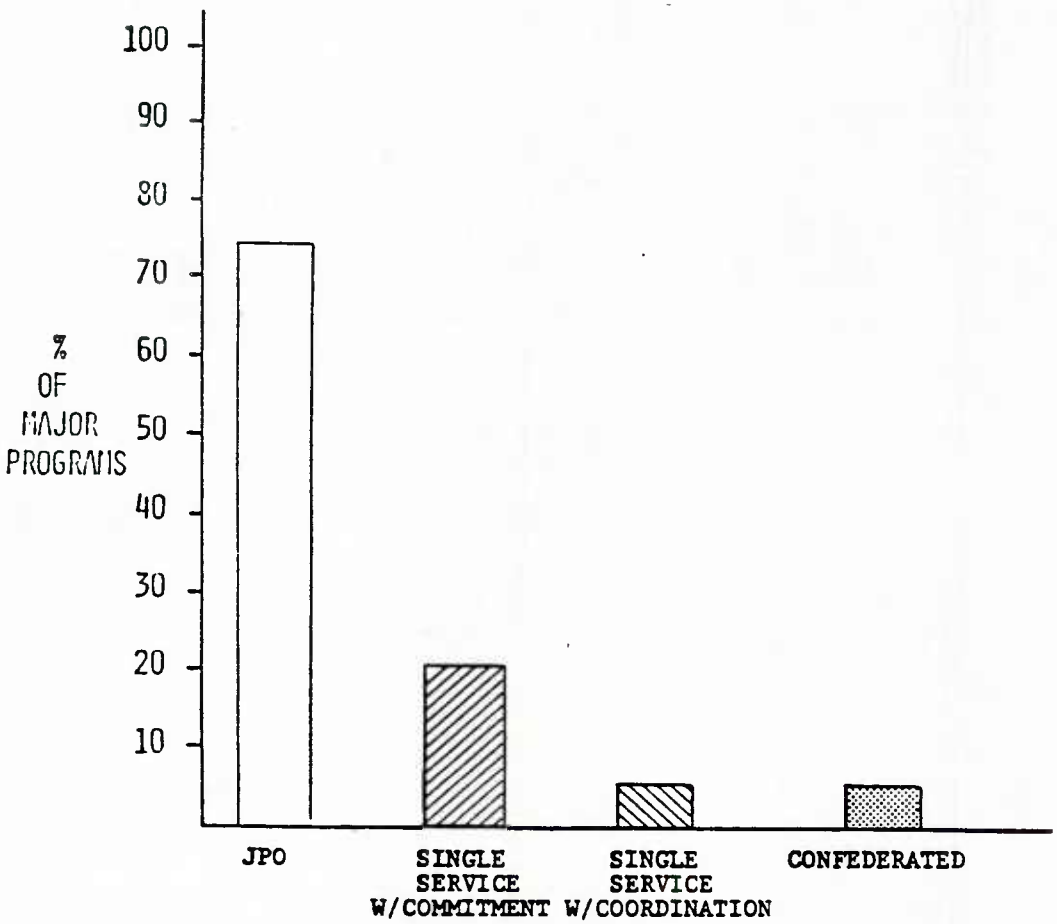

Figure 4.1-3 Major Program Management Organizations

Staffing - The lead Service manning level for major program offices averaged 87 percent of authorizations. About 80 percent of the major programs also had participating Service presence in the program office. The participating Services' manning level, however, averaged only about two-thirds (65 percent) of authorized levels. Many of the interviews and Program Manager Insight Comments emphasized the low level of participating Service help in the program offices. This was anticipated in non-major programs (and proved to be the case as is noted in the following paragraphs), but was somewhat surprising in major programs where the level of priorities and interest is high.

Charters and Agreements - Almost two-thirds of the major joint programs had charters (64 percent), and about half of these (52 percent) were jointly approved. Thus, only one-third (33 percent) of the major joint programs have a jointly approved charter. Also, 73 percent of the major program managers interviewed indicated that a charter did help, or would have helped, on the management of the program. A large majority (84 percent) of the major programs had a Memorandum of Agreement (MOA) between the lead and participating Services. The negotiation level on these MOAs was at a command level higher than the program office in 81 percent of the cases as shown in Figure 4.1-4. However, only about one half (53 percent) of these major program MOAs were negotiated at the Service Headquarters or higher, which is where many of the prime ingredients of a successful joint program such as requirements or funding are controlled.

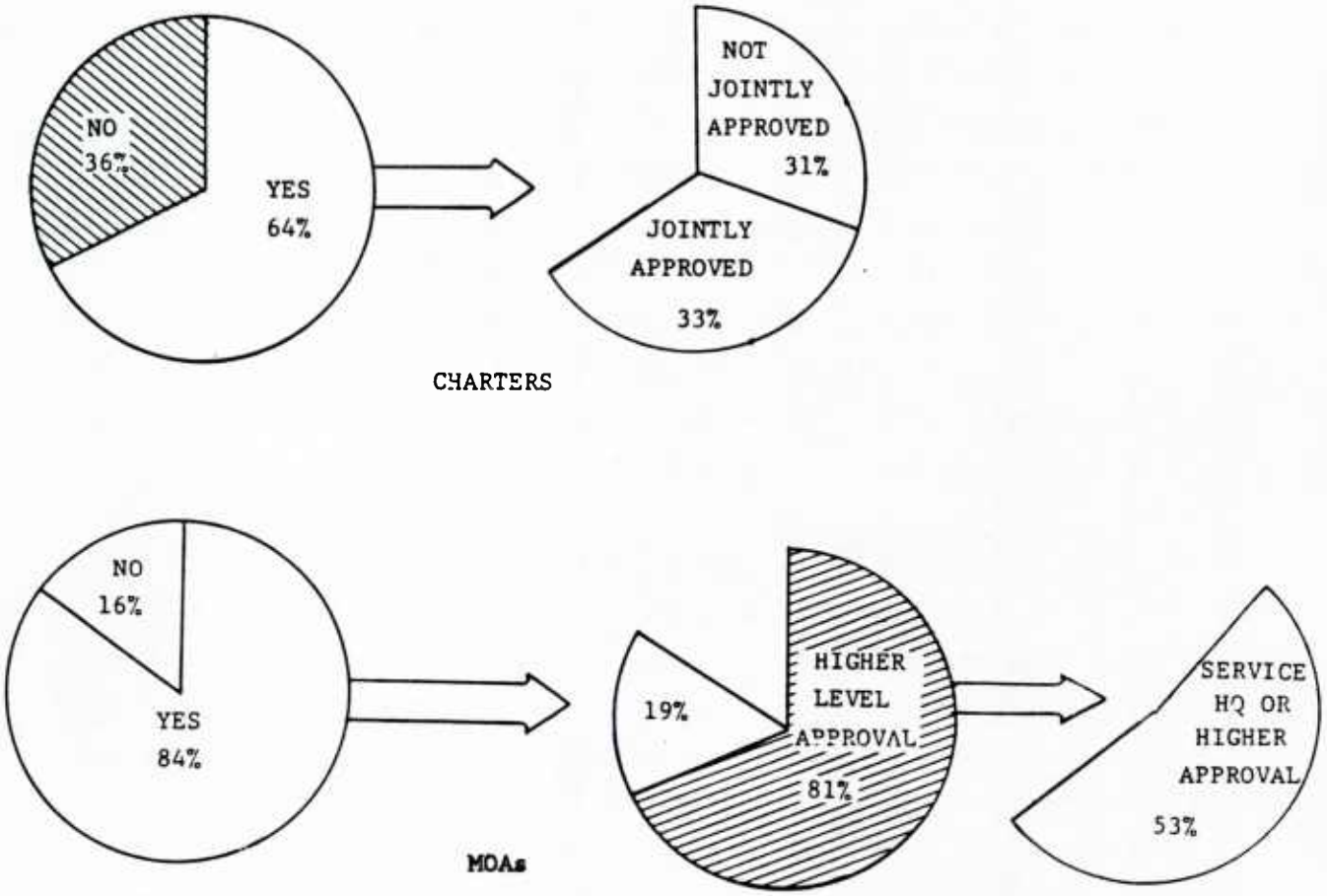

Figure 4.1-4 Agreement on Major Programs

4.1.2 Current Practices -- Non-Major Programs

Almost 60 percent of the programs in the data base are non-major. The relatively small dollar value of these programs and their relatively low priority when compared with major programs profoundly affects the way in which they are managed. In a ranking of relative priorities of programs, fewer than 30 percent of non-major programs are in the top

third. In comparison, 70 percent of major programs rank in the top third. When a formal agreement for a non-major program was made between the Services, it was approved at the Service headquarters level only 35 percent of the time.

Many of the non-major programs were "joint-buy" programs. Joint buys occur when one Service develops and procures an item that meets another Service's need. In some cases, the second Service (the Service buying in) follows and perhaps even participates in the development of the item. In other cases the second Service simply buys the end-item with little or no modification. A number of "Executive Agent" agreements within DoD establish arrangements that fall into this latter category. The Army, for example, is the executive agent and has responsibility for all wheeled vehicles and chemical defense equipment; the Air Force, for example, is the executive agent for space vehicles (satellites). Other Services wishing to procure this equipment must buy through the executive agent. Generally, DoD designates as the lead or executive agent the Service with the greater requirement for the equipment. Development and acquisition procedures then generally follow the process unique to the lead Service.

The same three issues were examined for the initiation phase of non-major programs as for major programs. Current practices in organization, staffing, and execution of program agreements and charters for non-major programs are discussed below.

Organization - Although management organizations for the non-major programs run the full spectrum of organization types described in the JLC Guide for the Management of Joint Service Programs, the majority of them are some form of single Service management office. Figure 4.1-5 shows the distribution of office types for non-major programs.

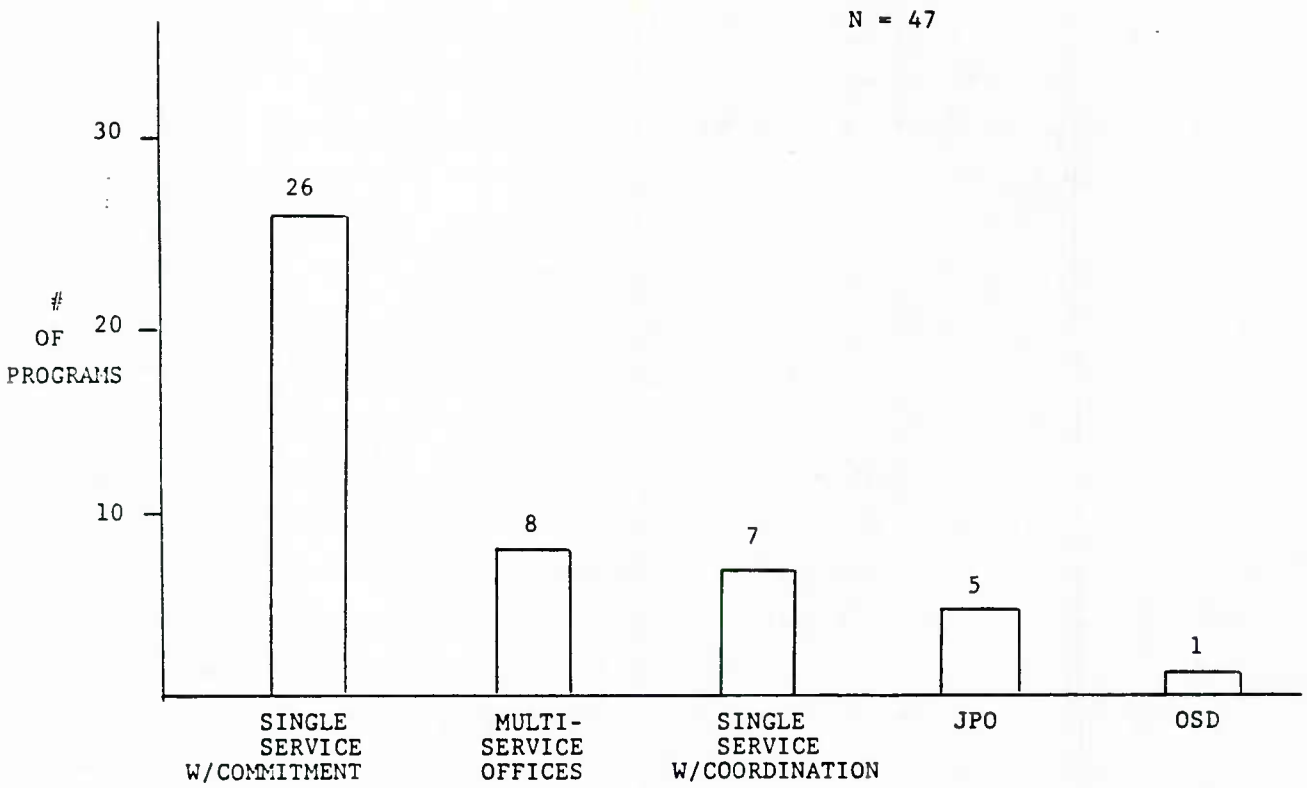

Figure 4.1-5 Non-Major Program Management Organizations

The difference between single Service with commitment and single Service with coordination is the level of formal commitment to the program by the participating Service. Generally, single Service with commitment involved obligation or expenditure of funds by the participating service, but did not entail any greater participation in the management of the program than did the single Service with coordination. Confederated programs were those organized primarily for the exchange of information and technology and where each Service retained its own office to manage its own programs.

Staffing - The staffing of a joint, non-major program is largely determined by the type of organization that the lead Service elects for management of the program. Only 53 percent of the non-major programs in the data base had any

authorization for participating Service personnel and 30 percent of non-major project managers indicated that their organizations were understaffed.

Charters and Agreements - Only 51 percent of non-major programs in the sample had a program charter. Given the relatively less complex nature of non-major programs and the traditional use or lack of use of program charters in less complex programs, this is not surprising. What is surprising, however, is the number of non-major programs with no jointly approved documentation of joint program responsibilities at all. Figure 4.1-6 shows the percentage of those programs that had a charter

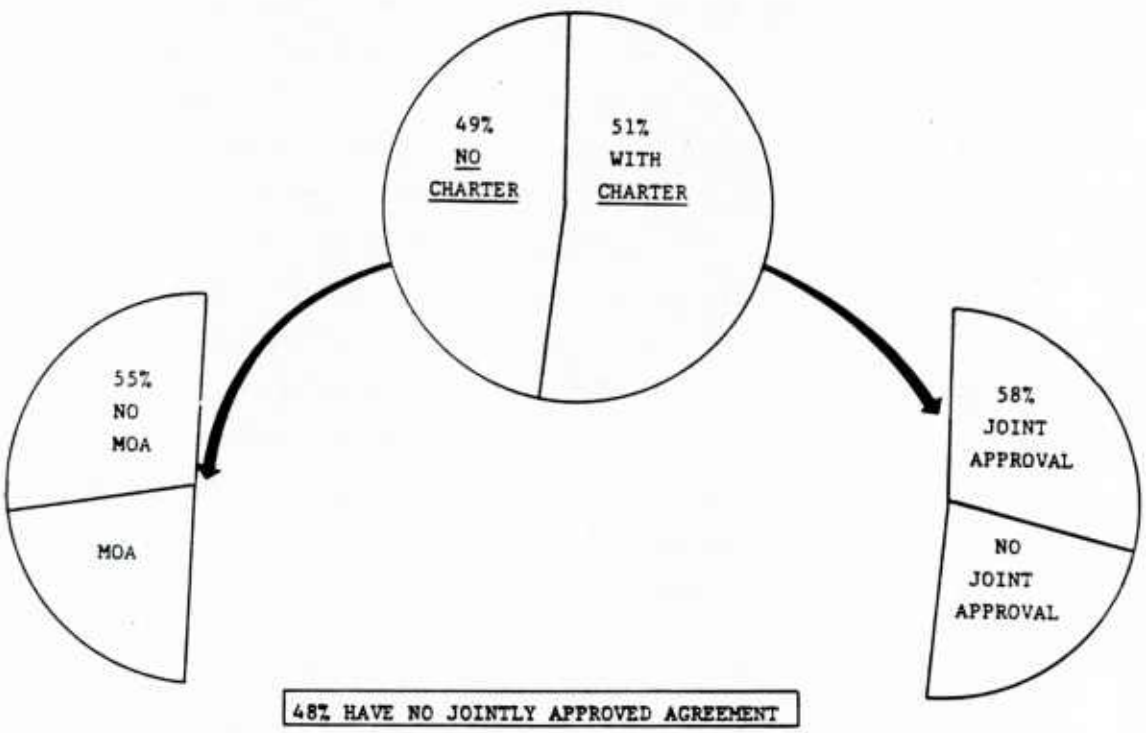

Figure 4.1-6 Distribution of Jointly Approved Charters and Memorandums of Agreement for Non-Major Programs

and that had it jointly approved and, for those programs without a charter, the percentage that had a Memorandum of Agreement (MOA) between the Services. The main point of this figure is to demonstrate that 48 percent of non-major programs had no jointly approved documents of any kind that specified the responsibilities for managing the program.

4.2 CURRENT PROBLEMS

4.2.1 Current Problems -- Major Programs

Initiation problems for major programs center around organizing the management structure, manning the program office, and negotiating and establishing the agreements (including defining the program manager's authority) that program managers rely upon to conduct the program. These are critical steps to getting a joint program started. If they are not done properly the lead Service program manager has no basis on which to deal with the participating Services and what would normally be minor problems are escalated up the chain of command to unusually high levels for resolution. Many program managers felt that well thought out and properly negotiated agreements between the Services would have precluded many of the problems that made managing a joint program more difficult than necessary.

Organization - As noted before, 73 percent of major joint programs have a JPO organization. Of the 27 percent that were not JPOs, 67 percent did not feel that they had the appropriate organization to effectively manage their programs. The major organizational deficiency cited by non-JPO program managers was the lack of participating service representation in the program office. Deficiencies in participating Service

representation, however, were also noted repeatedly even in programs with a JPO organization.

During the program manager interview process a rating was assigned for the appropriateness and effectiveness of the organization of each program office (See Appendix D). In general, programs with relatively high initiation success ratings (as discussed in Chapter 2) also had relatively high organization appropriateness and effectiveness ratings, as indicated in Figure 4.2-1. In this figure, average percentile rankings for organizational appropriateness and effectiveness are presented for two subsets of major joint programs. The subsets consist of major joint programs in the top quartile of initiation success and those in the bottom quartile of initiation success. The more successful programs had significantly higher average percentile ratings for organizational appropriateness and effectiveness. This indicates the importance of appropriate organizational structure in achieving successful initiation of joint programs.

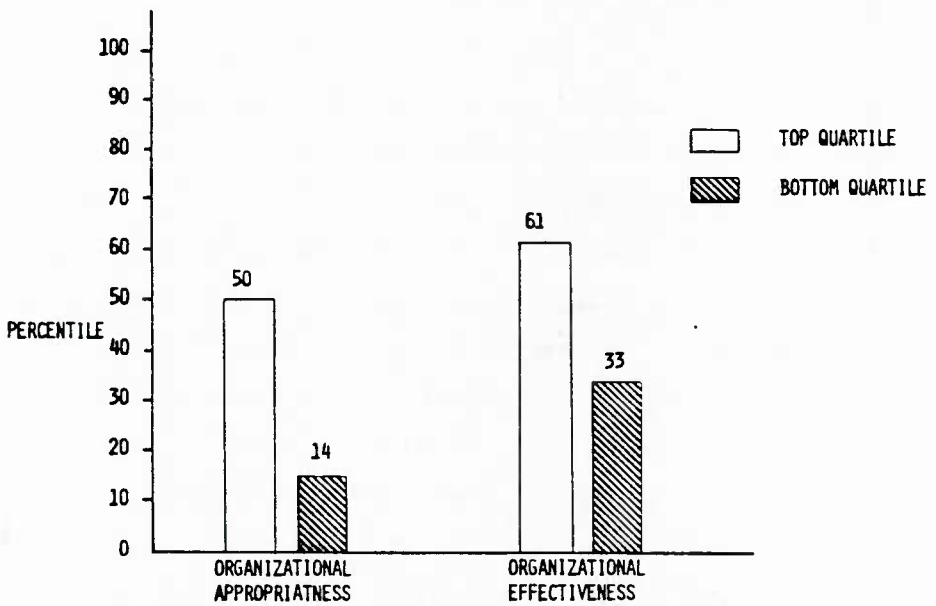

Figure 4.2-1 Organizational Factors Versus Major Program Initiation Success

Staffing - The lack of participating Service representation in the organizational structure of joint program offices was made more severe by the personnel management practices of the Services. In general, lead Service manning was reasonably close to authorized strength, but participating Service authorized positions were not filled at a comparable rate. Participating Service positions were manned at an average of only 45 percent of authorized strength for those programs in the bottom quartile of initiation success. Programs in the top quartile of initiation success had an average participating Service manning level that was 60 percent of authorized strength. Lead Service manning averaged about 85 percent for both quartiles. The average lead Service manning level of approximately 85 percent and the participating Service manning level of 45 to 60 percent strengthens the often heard story that joint programs need more participating Service presence in the program office, whether or not they are a JPO.

Charters and Agreements - As noted in paragraph 4.1.1, almost two-thirds (64 percent) of the major programs had a charter and a large majority (84 percent) had a MOA. Each program examined was given an inter-Service agreement rating. This rating combined several factors, including the inter-Service negotiation level, the existence or non-existence of MOA's, the timing of the agreements, and whether the agreements contribute to program execution. (See Appendix C for a full description). Examining the top and bottom quartiles of initiation success ratings shows that the top quartile had an average inter-Service agreements rating in the 58th percentile while the bottom quartile average was only in the 29th percentile; this is clearly a significant difference.

Charter effectiveness was also a composite rating of several items including assignment of responsibility and authority, need, preparation, joint approval, help in program execution, and essential key elements. The average charter effectiveness rating for the top quartile of initiation success ratings was in the 56th percentile and the bottom quartile was in the 31st percentile. Examining the same top and bottom quartiles for charter existence showed that 71 percent of the top had charters while only 25 percent of the bottom quartile did. On the other hand, of those managers of programs in the bottom quartile, 83 percent said that a charter did or would have helped in program execution while only 40 percent in the top quartile said the same. Thus, it appears the real value of charters and MOAs is in the actual development of those agreements and not the day-to-day execution of the program. This seems reasonable given that the real difficulty is getting the Services to agree on and commit to a program. Once the agreements are hammered out between the parties involved and negotiated and signed at the appropriate levels, the main value of the agreements have been realized. Those programs that had reasonably well structured agreements did not feel that they were that important to the execution while those programs that did not have these documents thought that good charters and agreements were very important.

In addition to charters and MOAs, cost sharing agreements are an important part of the family of agreements that define Service commitments to a joint program. All but one of the major programs had some sort of cost sharing agreement. Two-thirds of these agreements, however, were informal agreements, which was somewhat surprising for major programs. On the other hand, 64 percent of the program managers stated that the cost sharing agreement, in whatever form, was helpful and 65 percent stated that there were no cost sharing problems.

However, in examining the bottom and top quartiles of initiation success, 50 percent of the bottom quartile had some cost sharing problems and only 25 percent of the top quartile had any cost sharing problems. The cost sharing problems percentages in the bottom and top quartiles of execution success show the same trend with 83 percent and 33 percent respectively. Again, this indicates the importance of successful cost sharing agreements in achieving overall program initiation and execution success.

One other factor that indirectly relates to agreements is program manager authority. In joint programs, this authority is usually delineated in an inter-Service agreement. A program manager authority rating was assigned to each program in the study. This rating was based upon a number of subfactors including such items as charter effectiveness; special controls on the program manager; and the program manager's authority to make tradeoffs, identify funding needs, control allocated funds, control software and hardware configurations, communicate directly with other Services, and manage program office military and civilian personnel. These items and subfactors were then combined to arrive at an overall program manager authority rating specific to joint programs.

The study team found a strong correlation between program success measures, for both initiation and execution, and the program manager authority (PMA) factor (see Figure 4.2-2). Major programs in the top quartile of initiation success had an average program manager authority score in the 83rd percentile while the bottom quartile's average score was in the 19th percentile. For execution success, the corresponding percentiles are 85 and 51. As shown in Figures 4.2-3 and 4.2-4, there were similar correlations between PMA and

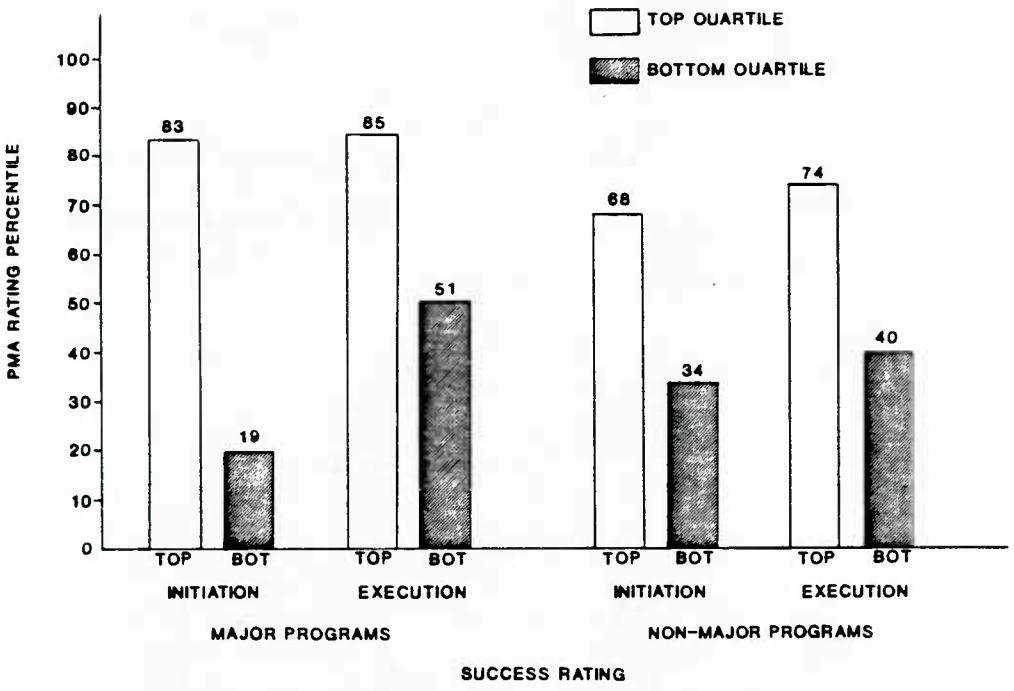

Figure 4.2-2 Program Manager Authority Ratings of Top and Bottom Quartiles of Initiation and Execution Success

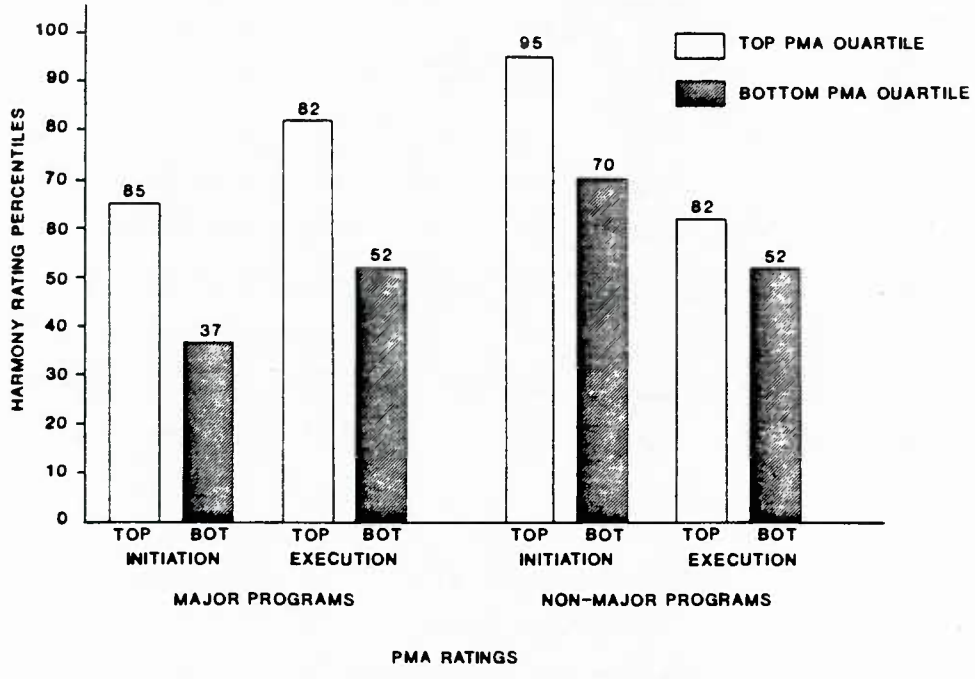

Figure 4.2-3 Harmony Ratings of Top and Bottom Quartiles of Program Manager Authority Ratings

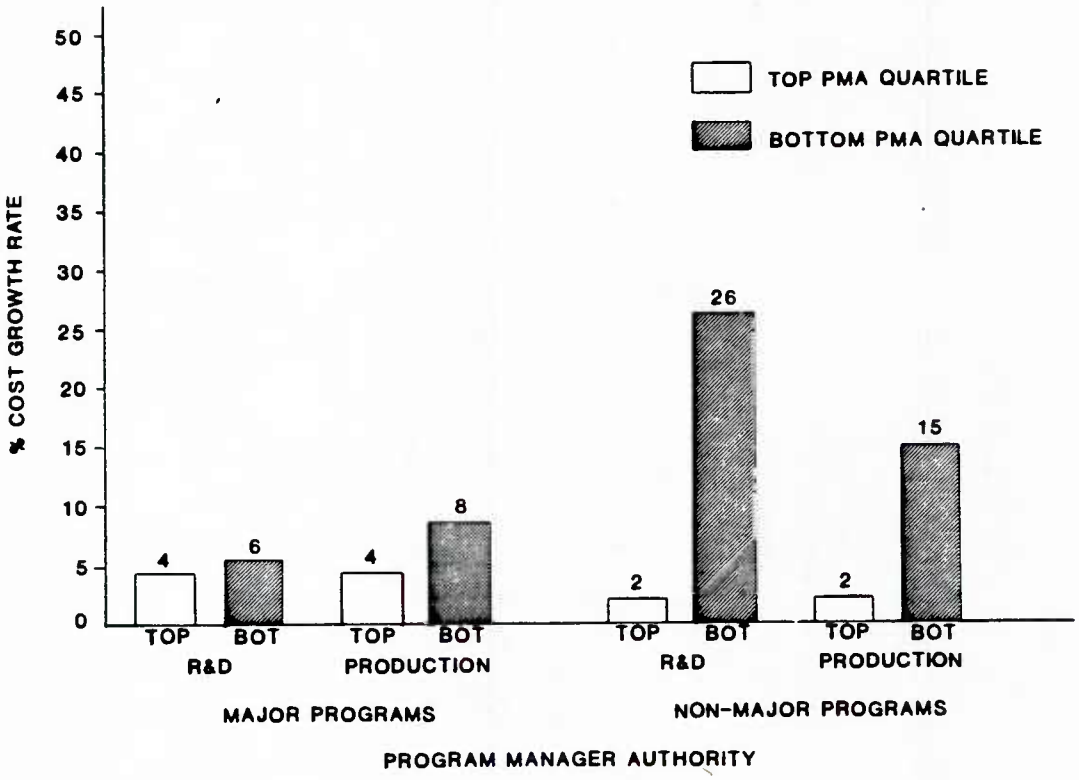

Figure 4.2-4 Average Annual Cost Growth Rates of Top and Bottom Quartiles of Program Manager Authority Ratings

Initiation and Execution Harmony, and between PMA and annual compounded cost growth rates for R&D and production. Thus, the relationship between program manager authority and joint program success appears strong. Those programs for which the program manager's authority is not clearly defined in jointly approved agreements seem to have a much lower chance for success.

A clear relationship also exists between PM authority and program harmony. Program harmony is defined as the ease with which a program is established and is explained in detail in Appendix C. Major program managers with an authority level

above the mean had programs which experienced more harmony during initiation. In general, managers (of both major and non-major programs) who had greater authority had programs with higher initiation harmony.

4.2.2 Current Problems -- Non-Major Programs

Perhaps the most striking thing the study group noticed about non-major programs was that very little changed in the initial program office organization despite significant changes in program requirements over time. In one program the group reviewed, the lead Service had initially planned only a small quantity buy of the equipment. One project engineer, therefore, was responsible for the program, with matrix support provided for such functions as logistics, contracting, and funding. As the program progressed, two other Services committed to buy the item, increasing the program to ten times its original scope. With this increase in scope, however, there was no parallel change in the managing organization or its manpower authorizations and nothing was written to document the agreements by the other Services to buy in. The organization and staffing of the program were probably adequate when the program started, but once it became joint, an entirely different management situation was created. Not only did the scope of the program escalate drastically, but the project engineer was saddled with procuring and provisioning for three Services instead of just one. Other management problems in initiation are described below for organization type, staffing, and charters and agreements.

Organization - As shown in Figure 4.1-5, most of the non-major programs are managed by a single Service office. The study group found that in many areas this solution worked well. As part of the interview process the group asked each

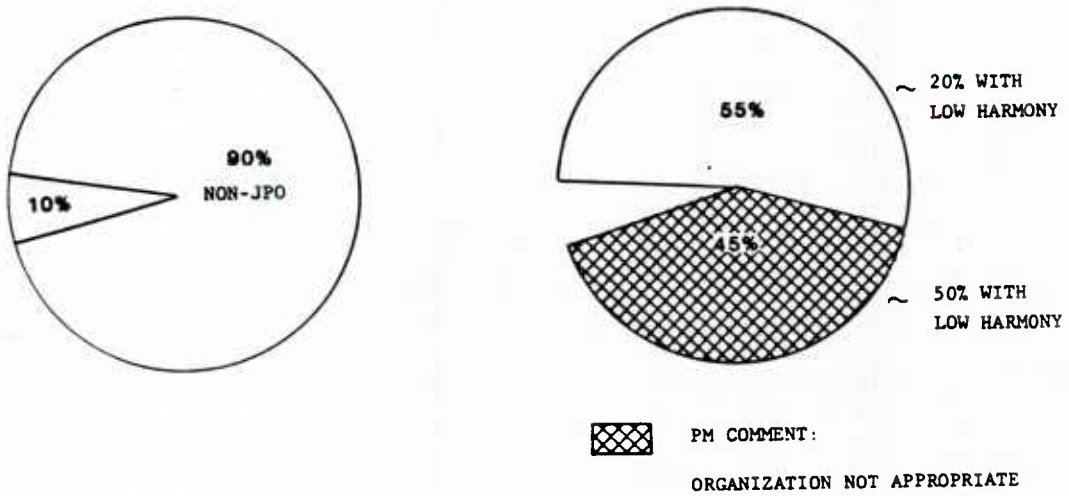

Figure 4.2-5 Organizational Appropriateness for Program Managers of Non-Major, Single Service Offices

program manager to assess the appropriateness of the organization to the joint Service mission. Figure 4.2-5 shows the responses to this question of the non-major program managers who had single Service offices.

Almost one-half of the program managers felt that their organization was not appropriate to handle the job. The major reason for this assessment was the lack of authorizations for participating Service personnel. When pressed further, the managers cited major difficulties in dealing with the participating Service, but almost universally felt that this problem could have been effectively handled if a participating Service representative had been present in the organization.

Staffing Policies - Non-Major Program Manager dissatisfaction centered not so much on organization type as on the lack of authorization for personnel from the participating Service. Figure 4.2-6 shows that almost half (47 percent) of the non-major program offices had no participating Service personnel. To underscore the difficulties this can create for the program manager, this figure also shows the incidence of low program harmony for programs with and without authorizations for participating Service personnel. The data clearly shows, however, that there is a much higher occurrence of major problems in the execution phase of those programs with no participating Service personnel in the management office.

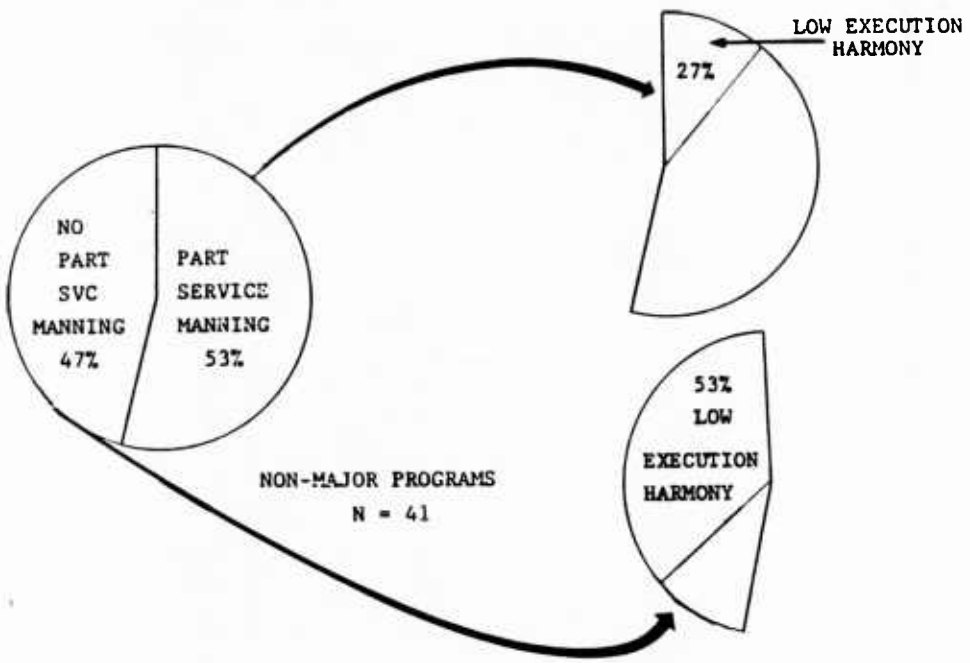

Figure 4.2-6 Non-Major Programs, Participating Service Manning Authorizations, and Program Harmony

Another issue relating to staffing policies is the problem of manning levels. This is relevant to both major and non-major programs and is a ratio of the personnel actually assigned to the office over the personnel authorized. Figure 4.2-7 shows the average manning level (assigned personnel as a percent of authorized) for non-major programs. While the manning level for participating Service personnel is slightly better for non-major programs than for major programs, the lead Service manning level for non-major programs is much lower. When compared to an average manning level of 93 percent command-wide in DARCOM, for example, it is clear that an average manning level of 76 percent in non-major joint programs is extremely low and a primary explanation of why the non-major program managers considered being understaffed as one of their major problems.

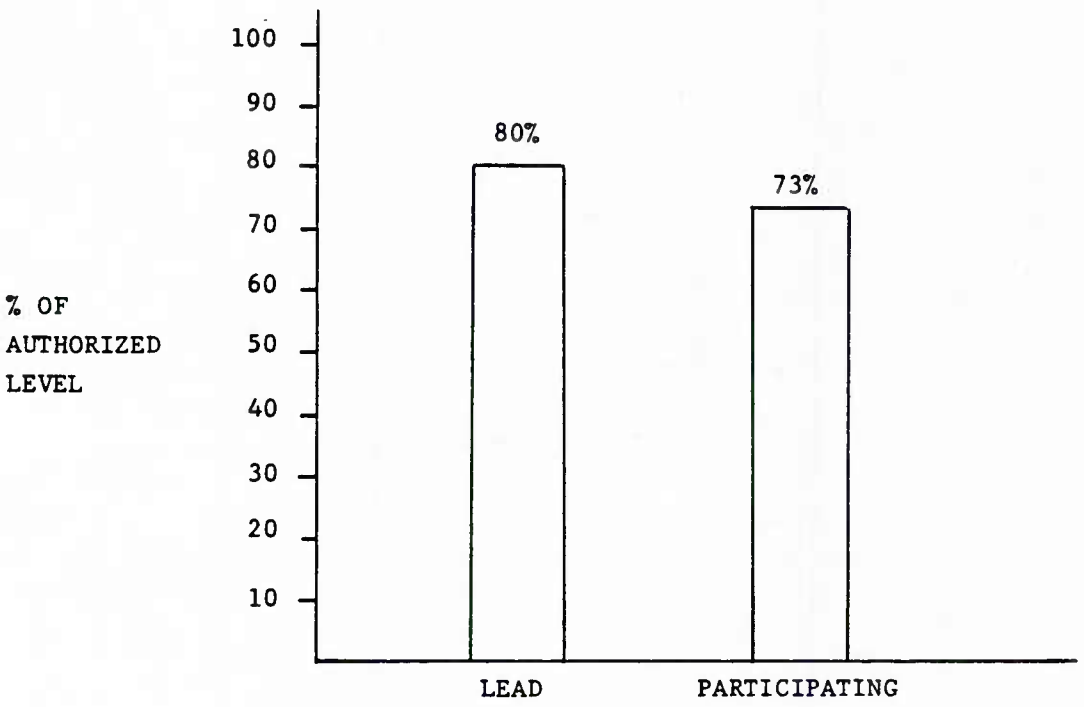

Figure 4.2-7 Average Staffing of Non-Major Programs - Assigned vs. Authorized

Program Agreements - As outlined in section 4.1.2, non-major programs have a marked lack of formal agreements between the Services. For some programs, this informal way of doing business was sufficient. A lack of formal agreements, however, creates the potential for serious problems and in many programs problems did arise because agreements were not formalized. One of the informally managed programs in the data base was a "joint buy" of a weapon system. This program had no charter for the program and no formal MOAs outlining management arrangements for the program. On numerous occasions small disputes at the working level in the materiel developers had to be elevated to the two Service headquarters for resolution. This cumbersome decision process added time to the program schedule and wasted a lot of the program manager's time and money. Properly worked out agreements between the Services would have circumvented this problem and saved the program manager both time and effort.

Program Charters - The program charter is the one document that is perhaps the most crucial to the successful initiation of a program. Not only is it essential that a program have a charter, but it must clearly define all aspects of the program manager's authority and responsibility. In addition, the charter must be jointly approved by all Services involved in the program so that all potential problem areas are considered.

The study group measured the effectiveness of each program's charter on a scale of one to ten. The questions used to assess charter effectiveness were based on an outline of essential charter elements found in the JLC Guide for the Management of Joint Service Programs. Figure 4.2-8 compares establishment harmony for those programs at the bottom and those programs at the top of the spread for charter effectiveness grades.

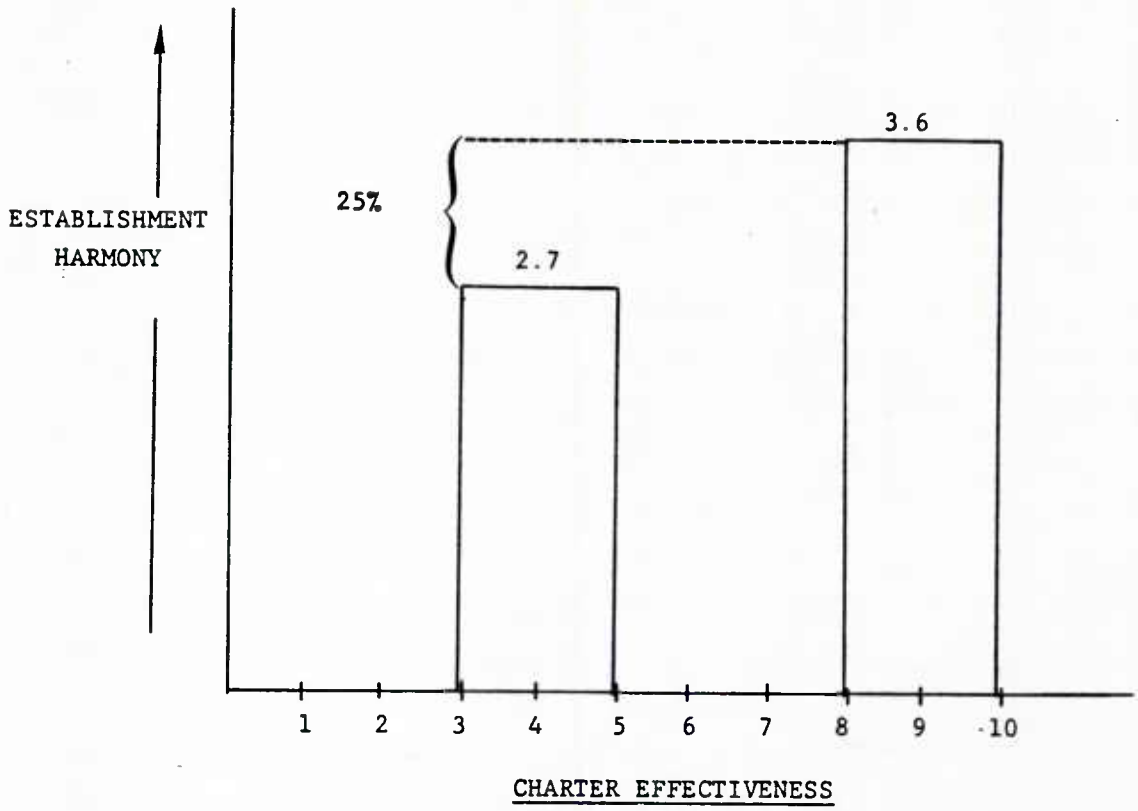

Figure 4.2-8 Establishment of Harmony and Charter Effectiveness

It is clear from the data in Figure 4.2-8, that the more comprehensive the charter, the fewer the problems encountered in the establishment of the program.

4.2.3 Summary

The findings of the study group for the initiation phase of joint programs point toward one major problem; the procedures for organizing, staffing, and chartering a joint program are essentially adaptations of single Service policies. Depending on the scope and importance of the program, this adaptation could range from extremely significant to almost unnoticeable. While this practice seems sufficient for some programs, a large number encountered problems because

they were not prepared to handle the unique challenges of working in a joint Service environment and, therefore, probably did not achieve the full benefits of jointness.

4.3 RECOMMENDATIONS TO IMPROVE JOINT PROGRAM INITIATION

Recommendations on initiating joint programs center around the three major problems of choosing an organizational type, staffing the program office, and establishing joint agreements. Other items such as the program managers' authority, funding arrangements, methods of accommodating changes in quantities or funds, and even withdrawal from the program can, for the most part, be included under these three major categories which are discussed below. However, those items important enough to be addressed separately are discussed in paragraph 4.3.3.

4.3.1 Organization and Staffing

After analyzing the findings in the initiation phase, it became clear that the findings on organization type and staffing were so interrelated that it was impossible to discuss one without the other. For the purpose of making recommendations, these two issues will be discussed together. Although addressed together, there are separate suggestions for major and non-major programs concerning organization and staffing. Recommendations concerning charters and agreements are the same for both major and non-major programs.

Major Programs - Due to the scope and complexity of major programs, all major programs should have a formally designated Joint Program Office. The Services involved should agree on the composition of the office and on the details of

each Service's participation in the office. Once these authorizations are agreed to, each Service must commit to staffing their positions to the same manning level as the lead Service. Figure 4.3-1 outlines a possible structure for a Joint Program Office and shows participating Service positions specifically recommended for JPOs. This chart is based on the program managers' suggestions as to how they would augment their offices if given the opportunity.

Non-Major Programs - It is not practical to expect all non-major joint programs to have a joint program office. When the program goes joint, however, some changes must be made to accommodate the increased workload. Consideration should be given to the scope and technical complexity of the program, geographical separation of Service action offices, the degree of high-level interest, and any other important or unique

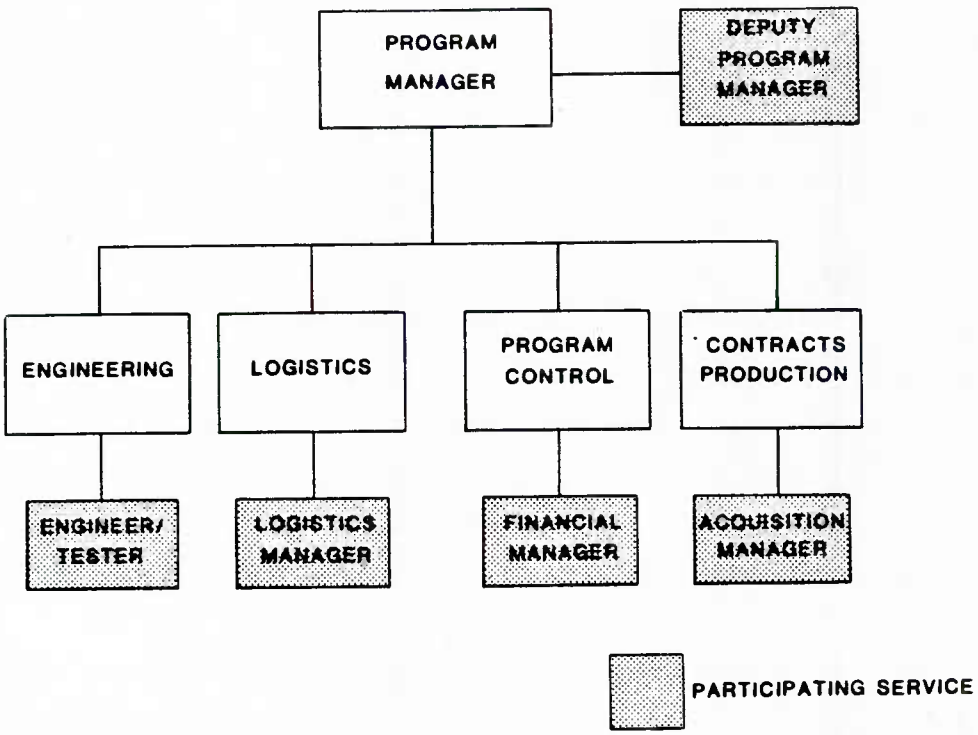

Figure 4.3-1 Suggested Minimum Participating Service Staffing in Joint Program Offices

aspects of the program. A realistic evaluation of these factors will help commanders decide how to augment the existing organization to accomplish its mission. The need to assign participating Service personnel to the program office must be negotiated between the Services and all decisions should be documented in program agreements such as the Program Charter. Once participating Service manning levels are established, it should be a matter of command attention to see that they are met on a continuing basis.

4.3.2 Program Charters and Agreements

Obtaining formal agreements between the Services on management responsibilities and authority for the execution of the program is critical to the success of a program. It is equally important that the program manager be given the authority to operate across functional and command lines in the joint environment. A good joint program charter is the perfect vehicle for accomplishing this task. It should, therefore, be written and jointly approved for all joint programs.

The content of the charter is as important as its existence and must be carefully constructed for each program. The JLC Guide for the Management of Joint Service Programs outlines some very important elements of a joint charter. The following elements are considered essential to a joint program charter:

- Program objective
- Program manager authority
- Program resources and funding agreements

- Joint Service responsibilities
- Program office organization and staffing
- Key participating Service personnel responsibilities.

4.3.3 Funding Practices and Agreements

Funding agreements, usually covered under joint agreements, merit special recommendations and are discussed below.

Single Service Versus Multi-Service R&D Funding - Program managers provided mixed responses to the question of whether or not the R&D portion of a joint program should be funded by a single Service. Some favored single Service funding for better control and stability while others favored shared funding to assure continued interest and support from the participating Services and for flexibility in being able to receive and use funds from different Services. Although no clear picture emerges from the interviews, examination of the initiation success rating does indicate that programs that have single Service funding of R&D have done better from an historical point of view. Seventy-one percent of the top quartile of major programs in the initiation success rating were single Service funded while only 30 percent of the major programs in the bottom quartile were. For non-major programs, where a majority of the programs are single Service funded and managed, the corresponding percentages were 78 percent and 47 percent. Thus, historically, single Service funding appears to be the preferred method of funding R&D for joint programs. However, if the Services commit to joint programs as recommended in this study, the differences between single and multi-Service funding of R&D may not be as great.

Provisions for Changes in Quantity - The transition from R&D into production is a difficult step in any program. It can be doubly difficult in a joint program. As a joint program moves into the high cost production phase, affordability problems can and often do arise in more than one Service. Questions as to which Service will take the earlier production items with their potentially lower quality, performance, and reliability at a higher cost further complicate the move into production. As a result, one or more of the Services on a joint program often change the quantity of early production items they are willing to buy. For single Service programs, quantity changes affect only one Service and those effects are considered when that one Service decides to change the quantity. On a joint program, however, decisions by one Service to change the quantity they are willing to buy can greatly and adversely affect another Service by increasing the unit cost, and thus the affordability of the item. This problem is especially acute just before and during the transition to production, making participation in a joint program risky at best.

A well thought out, negotiated, and jointly approved agreement between the joint program participants can alleviate this problem. An agreement with provisions for the Service who instigates the changes to absorb or lessen the effect on the other Service(s) will minimize the negative effects of quantity changes. Without such provisions or restrictions, participants in joint programs will continue to make unilateral decisions that produce multilateral effects on the other Services, resulting in additional costs of hundreds of millions of dollars as was seen in this study.

Provisions for Absorbing Cost Growth - Another issue frequently discussed during the interviews was the problem of how to deal with cost growth in a joint program. In particular, methods of apportioning cost growth between the Services in jointly funded programs and ways to ensure accountability for cost growth on the part of the participating Services in single Service-funded joint programs were addressed. As cost growth seems to be a recurring problem on joint programs, methods for dealing with it should be addressed prior to its occurrence. This can be accomplished through agreements established during program initiation. These agreements, generally MOUs, should specifically address how cost growth will be apportioned among the participants. Cost sharing formulas are usually specified in joint program MOUs, but the sharing of cost growth is not. Since cost growth is such a common occurrence, the MOUs should also clearly address ways to handle this problem between all Services involved in the program.

Penalties for Unilateral Withdrawal - Unilateral withdrawal from a joint program by one of the participants usually causes an unexpected burden on the remaining participant(s). These burdens may involve unanticipated and unplanned budget needs, increased unit costs that affect affordability, and increased production quantities that must be accommodated earlier than expected. These burdens could be eased if joint program agreements addressed the withdrawal issue before-the-fact and established provisions whereby the withdrawing Service would have an obligation to share the financial hardship placed on the remaining Service(s) by the withdrawal. These provisions would have to consider the phase of the program, ways to divide the financial burdens, and schedule impacts. The way in which these provisions are administered will also be a key item in any such agreement.

4.3.4 Commitment, Step Two

Completion of satisfactory organization, staffing, and charter agreements constitutes the second step in the commitment process. The first step, as discussed in Chapter 3, would establish the general characteristics of an agreed upon program at the time of joint program selection. The second step provides for detailed agreements affecting program management and execution. This step needs to be completed at the time of program office establishment or soon thereafter. This will generally occur early in the development cycle, as indicated in Figure 4.3-2. For programs that become joint later in the development or production phases, these critical agreements will obviously be negotiated at those later phases. The important point is that timely completion of these agreements will greatly facilitate successful initiation and execution of future joint programs.

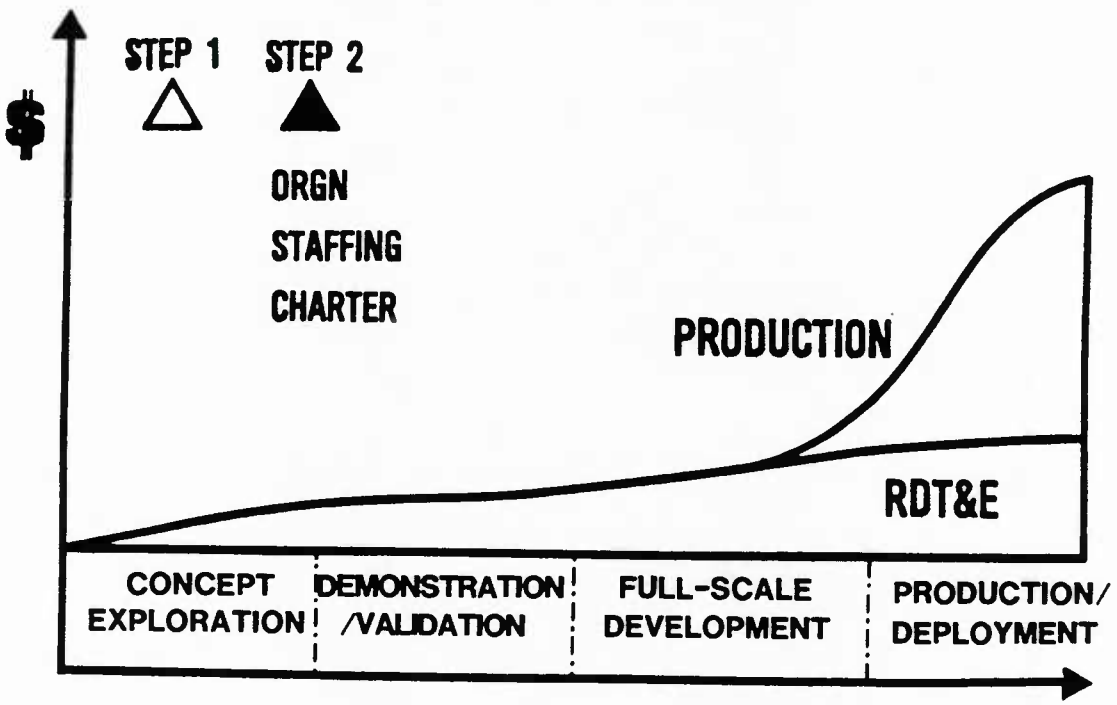

Figure 4.3-2 Commitment, Step Two

5. EXECUTION OF JOINT PROGRAMS

This chapter addresses a number of practices and problems that were observed in the execution of joint programs and which have been alluded to in the preceding chapters. In fact, certain problems observed in joint program execution have been cited as the basis for recommendations to improve the processes for selection and initiation of joint programs. This chapter highlights these problems and makes additional observations about a broad range of differing Service business practices that complicate the execution of joint programs.

5.1 CURRENT PRACTICES

The range of current practices with respect to joint program execution is extremely broad. Such topics as funding, contracting, logistics planning, testing, production planning, program control, and others could all be examined in depth. The limitations of time and resources imposed on this study permitted only a cursory look at many of these issues, and only the major findings are addressed here. The primary focus is on two major issues: program instability and differing Service business practices that affect joint program execution.

5.1.1 Program Instability

Chapter 2 noted that joint programs are particularly susceptible to funding instability and requirements resolution problems. These problems are a direct result of

the involvement of multiple Services in the program budget and requirements formulation process. Changes in program resources and requirements are subject to the vicissitudes of not just one Service decision process, but two or more. These changes are often made unilaterally by each participating Service in response to changes in individual Service needs and priorities over time. Changes by one Service are often made independently of changes made by other participating Services, despite the fact that the costs of each Service are mutually interdependent. This contributes to substantial confusion in the budget formulation process, and major increases in total program cost. Data relating high funding turbulence to increased cost growth and schedule growth was presented in Chapter 2.

The prevalence of unilateral program changes in joint programs is attributable, in part, to the fact that there are generally no penalties or disincentives in place to discourage such changes. The absence of such penalties preserves maximum flexibility for the Services in making budget adjustments, but compounds the difficulties of budget formulation by contributing to program cost growth. Furthermore, costs are imposed on other participating Services when the funding support of one Service is reduced. Typically, the unit costs of the program for all participants will increase when one Service reduces its level of participation. These increases in cost must be borne by the other Services, despite the fact that they can be attributed to the budget reduction of only one Service.

In Chapters 3 and 4, a strong emphasis was placed on definition of funding arrangements for joint programs and creation of an environment which fosters and sustains commitment by all participating Services. A need exists to restate that commitment and control unilateral changes as joint programs proceed into the execution phase.

5.1.2 Business Practices

Different Service business practices make execution of a joint program more difficult than necessary. Although these differing practices can be (and most often are) worked around, the effort expended in resolving these unique joint program problems detracts from the primary management function of meeting cost, performance, support, and schedule goals. The most significant differences in business practices are discussed below.

Differing Service Philosophies and Traditions - When teamed in a joint acquisition, Service representatives quickly become aware of the differences in the way in which their Services develop and buy needed commodities and of the need to find common ground if their program is to succeed. These differences include philosophies of dealing with contractors, the writing of technical specifications, methods of doing the day-to-day work of the program office (things as mundane as formatting a letter or as complex as budgeting), protocol in dealing with the chain of command, allocation of authority and responsibility within the chains of command, the use of matrix versus in-house management, or the modus operandi of the program manager. In most cases, the practices of the executive Service are followed in the program; participating Service personnel must accommodate to these changes while at the same time continuing to respond to the requirements placed on them by their own Services.

Origin of Difference: Tradition vs. Necessity - Reconciling different Service business practices is not a matter of placing a broad value judgment on which Service's methods are best. While each Service can point to particular practices with pride, none can claim that it has introduced

exceptional wisdom into all that it does. In some areas, Service-unique practices stem from different operational requirements. Some significant differences in support concepts, particularly levels of maintenance, are driven by the operating environments of each Service. Consequently, some facets of logistics, beginning in many cases with the maintainability design of the equipment, must incorporate the unique and widely-varying needs which each user has for the same commodity.

In general, however, Service-unique acquisition approaches do not arise from necessity. Rather, most policies and procedures of the Services have evolved in response to the dynamic needs of large organizations. In a joint program these practices are different and ways must be found to adapt them to one another in a complementary manner.

5.2 PROBLEMS IN JOINT PROGRAM EXECUTION

The program instability and differing Service business practices observed above contribute significantly to the difficulties in executing joint programs. Among these difficulties are program cost growth and stretchout as well as confusion, inefficiency, and conflict within the program offices.

5.2.1 Program Instablity Increases Cost

Data was presented in Chapter 2 relating increased funding turbulence and requirements resolution problems to greater program cost growth. The primary mechanism which brings about this cost growth is the stretchout of development time and the reduction of production rates. Increases in

development time force a program to absorb more indirect overhead costs and increase vulnerability to program changes and inflation over time. The reduction in production rates also results in a corresponding increase in unit cost.

The recommended commitment steps at selection and initiation are intended to resolve requirements issues and to reduce the tendency for Services to unilaterally change joint program funding. A third commitment step to a program baseline at the start of fullscale development is also needed to reinforce this commitment and control change. This concept is discussed in detail in Section 5.3.1.

5.2.2 Differing Business Practices Create Confusion, Inefficiency, and Conflict

Differing Service business practices can have a significant influence on the ease or difficulty of executing a joint program. The major problem areas in which differences arise are discussed below.

Military/Civilian Roles and Personnel Policies - One of the top problems for joint programs is acquiring adequate numbers of personnel with the proper expertise from each of the Services. The different approaches by which each Service staffs its single Service program offices in combination with the different career patterns for acquisition personnel within each Service, have a profound effect on personnel problems within JPOs.

The Army and Navy generally do not assign their officers to acquisition management positions until they have reached grade 0-4. As a result, these Services do not have large numbers of officers highly-trained and experienced in

acquisition management. The competition to obtain officers to fill acquisition billets is keen, supply rarely meets demand, and large numbers of civilians staff Army and Navy program offices and fill functional billets within their acquisition commands. While in some instances the civilians fill vacant military billets, their permanent presence provides a level of expertise and continuity complementing the skills and operational experience furnished by the military. Despite concerted efforts within these Services to highlight the desirability of a career in the acquisition management field, the general perception within their officer ranks is that promotion is achieved by spending time at sea, in airplane cockpits, or in the field with troops.

Air Force program office positions, in contrast, are filled by more uniformed officers than is the case in the other Services. The Air Force has created a viable acquisition management (including engineering) career path, assigning its officers to acquisition management positions early in their careers and thus producing more officers qualified to fill acquisition positions. Captains and even lieutenants are commonly found in program offices as well as in functional or technical billets within AFSC and AFLC.

Program managers (especially those from Air Force-led joint programs) frequently indicated that the participating Service did not staff the program office with enough personnel of the correct disciplines. At least three phenomena are at work here. First, Navy program offices have a small core of personnel and draw on a functional matrix and support contractors to accomplish much of the work of the program. The Army has a larger program office core, but still has a low military to civilian ratio. Second, the Army and the Navy staff both their single Service program offices and their joint offices

with fewer officers than does the Air Force. As these civil servants employed by the Army and the Navy are often reluctant to make the physical move that assignment to a joint program usually entails, they are not a plentiful source from which to make up the lack of uniformed personnel. Third, people are always in short supply, and single Service program needs often take priority over joint programs in which the Services have participant roles.

The net effect of these phenomena is a shortage of people from the participating Services. As programs decrease in priority, visibility, and importance, the personnel problem worsens, and in some programs there may be no one present at all from a participating Service. Here the program manager may even have difficulty establishing reliable points of contact within the other Services, having in some cases to seek out people buried in a functional matrix organization in a location geographically removed from his own. Managing the Service interface, absent competent people to work its day-to-day activity, may become one of the program manager's most significant problems. When these problems become too difficult to resolve, the benefits of joint programs begin to erode.

Management Practices and Organizations - Each Service brings to a joint program a chain-of-command, an organizational structure, and management practices with which the other Services must become acquainted and must learn to function. The Air Force even brings two organizations to a program, AFSC and AFLC. Joint program personnel from the other Services will, at some point in a program, have to deal with both Air Force organizations and must, therefore, learn the procedures of both. Since AFSC funds product development and AFLC funds support, an early financial interface with both organizations will be needed.

The review and approval chain of the Services varies between each Service. The Services usually do not hold joint reviews, and inevitably program office personnel from all Services must support the time-consuming process of meeting the needs of all review chains. This workload increases dramatically if the program is monitored by a high-level oversight group. Each Service, therefore, must thoroughly address the other Services' program approval process. In order to avoid withdrawals, the program manager must ensure that all requirements of each Service are met and approved. For example, the Navy's approval for Service use (ASU) process (now replaced by approval for production), has been a necessary precursor to release of Navy production funds and an extremely difficult milestone to pass. The Navy's AMRAAM test program was largely scheduled around obtaining ASU for AMRAAM based on missile compatibility with the weapon release and control systems in Navy airplanes. This will occur after the missiles are tested, and as a result, Navy production buys lag significantly behind those of the Air Force.

With the exception of strategic programs such as Trident or Cruise Missile, Navy programs rely heavily on support from a functional matrix. The matrix approach is not unknown in the Army and Air Force, but it occurs to a lesser degree and in programs lower in priority. Even though high-priority Navy programs may be more heavily staffed than other lower priority Navy programs, these high-priority programs would probably be considered minimally staffed compared with Air Force or Army program offices. The Sparrow and Maverick programs illustrate this point. At one point during AIM/RIM-7M development, 16 people manned the Sparrow office, 1 Navy officer (the Project Manager) and 7 civilians, 5 Air Force officers and 3 civilians. The office was extensively supported by the functional matrix within NAVAIR HQ and by

Navy laboratory centers. At the same point in time, the Air Force Maverick program office (although having more on-going development programs, including the joint Service Laser Maverick) had approximately 90 people.

Matrix management is not unworkable, and it offers certain efficiencies in the use of personnel. However, when it is combined with understaffing on the part of the participating Service in a joint program, the result can be chaos and reduction in the program manager's authority. Without a participating Service representative to provide the proper interface, the program manager must devise a way to work with people in the functional matrix of the other Service to move funds, work logistics, and staff required suspenses. The program manager has no authority over these people, they are not accountable to the program manager, and in all likelihood they are greasing the "squeaky wheels" of their own organizations. The problems caused by this lack of participating Service people and the difficulties finding effective focal points in that Service were eloquently articulated by one program manager. This program manager's most significant management problem was a

> ...lack of appropriate manning by the requiring Service. Four people were required... support ranged from zero to two. Direct contribution to the other major management problems, including...logistics management continually behind the power curve...Program budgeting erratic and inconsistent with program needs...Program management in general was complicated by an inadequate direct interface with the other Service and the lack of involved people intimately familiar with their way of doing business. The result was to increase the work load above that which should be necessary to manage the program. These problems also tended to destroy confidence and team work between my office and their acquisition organization.

Finally, Navy projects are managed from offices in Washington, whereas the other Services have program offices dispersed throughout the United States. The Navy has developed procedures and means of communication that facilitate management from the program office while maintaining an efficient interface with headquarters. When the Navy staffs an out-of-town JPO as the participating Service, personnel in the headquarters do not know how to manage this remote entity, which may represent a program in which the Navy preferred not to participate. One Navy Deputy reported that the

> ...Navy is highly reluctant to transfer program management to a location which is geographically remote from the Washington headquarters/ material command complex. As a result, the Navy Deputy has neither the specific authority nor the defined responsibilities necessary to function effectively as manager of Navy aspects of a joint development effort. Frequently, Navy management decisions are made and positions established without prior knowledge by - or inputs from - the Navy Deputy.

The Navy Deputy in another program similarly reported that coordination would be better if the JPO had been in Washington, and that day-to-day working problems resulted from Navy engineering support being located elsewhere within a matrix while the executive Service's support was co-located.

Contractor Roles - Different ways of employing contractors can also cause problems for the other Services in a JPO. The Navy frequently requires intense government interaction in activities such as the validation and approval of the production data package and the qualification of second sources at the prime and sub-tier vendor levels. The Air Force tends, however, to rely more on the prime contractor to

perform these functions. Conversely, the Navy relies upon support contractors to provide management and technical assistance, particularly in the logistics area, to a much greater extent than do the other Services. In effect, the Navy carves out portions of management activity which can be contracted, thus supplementing the government staff and compensating for the deficiencies in support provided by the matrix structure. To the other Service(s) in a joint program this approach is not unworkable, but it does present a new way of doing business. While the study group does not advocate that one or the other approach is better, resolution of these differences consumes time and effort. In the extreme, costs and schedules for all Services may be affected.

Contracting Policies - The Services differ in some respects in their basic contracting philosophies. One such area is the use of fixed-price contracts as opposed to cost-reimbursable contracts. A comparison of the three Services' recent contracting histories is presented in Table 5.2-1. In recent years, AFSC has adopted the philosophy that fixed-price contracts are appropriate even for technically-ambitious development efforts. Their rationale is that a fixed-price incentive (FPI) contract establishes adequate risk protection to the contractor while still providing incentives to manage within agreed-upon cost projections. The Navy concurs with the use of fixed-price contracts in an acquisition program, but continues to believe that cost plus contracts are more appropriate for early development efforts that address high technical risks in which many unknowns are likely to emerge. When a program is jointly funded, these kinds of differences can lead to friction and subsequent recriminations when problems arise.

TABLE 5.2-1

RECENT SERVICE HISTORY OF CONTRACT AWARDS BY TYPE

	Contract Awards Actions Over $25,000[3]			
	FY82		FY83	
	% of Cost	% of No. of Cont.	% of Cost	% of No. of Cont.
ARMY				
FP[1]	75.3	90.8	79.2	85.9
CP[2]	24.1	7.5	20.1	11.7
Other	0.6	1.7	0.7	2.4
NAVY				
FP	65.3	78.7	77.7	71.8
CP	33.5	16.4	21.3	23.2
OTHER	1.1	5.0	1.0	5.0
AIR FORCE				
FP	80.1	91.9	83.5	85.1
CP	18.4	5.8	15.3	11.6
OTHER	1.5	2.2	1.2	3.3

[1]Fixed-Price Type

[2]Cost-Reimbursable Type

[3]Source: Department of Defense Prime Contract Awards, Fiscal Year 1983; Department of Defense Washington Headquarters Services

Financial Management - A continuum of financial management events places additional burdens on joint programs. High-level policy and strategy actions approach the level of gamesmanship to the program manager who frequently must fight to get OSD-mandated or jointly-agreed funds actually released from the participating Services. Once that is achieved, the program manager then must accommodate the Services' different accounting and reporting procedures.

One program manager reported that one of his most significant management problems was late (six to eight months) receipt of financial data obtained from the lead Service accounting system. Delays in receipt of funds caused by the different funding processes of the Services can delay contract execution or raise costs if the executive Service feels compelled to proceed with a buy before participating Service funds are available. This will normally not happen in annual buys of major end items, but can frequently occur when purchasing support items. Different constraints on the use of money can also reduce the flexibility needed to run a smooth program. Some programs fund annually while others fund in two-year increments.

The Services may also use different appropriation accounts to fund similar tasks. Procurement data, for example, is bought by the Army with RDT&E funds, but with production funds by the Air Force. Mixing these two sources on one funding document may require significant interaction with and justification by the executive Service comptroller. The Services may also have differences in the way in which functional support is obtained. On AMRAAM, much engineering support was provided "free" to the Program by Armaments Laboratory engineers at Eglin AFB who are institutionally funded. However, program funds were needed to obtain engineering support from the Naval Weapons Center, which is principally industrially funded. Differences such as these come as a surprise to JPO personnel and they immediately become an unbudgeted requirement. In the M-939 5-Ton Tank Program the Marine Corps required much more detailed financial reporting than did the Army, but had furnished no one to the program office to shoulder the additional burden. Clearly none of the above occurrences are in themselves insurmountable impediments to program execution. Resolving all these problems, however,

increases frustrations, and requires people, time, and expenditure of program resources without adding value to the final product.

Budget Process - The different budget and POM processes of the Air Force and Navy create a significant additional workload in their joint programs. The Air Force develops their POM using a "bottoms-up" approach, beginning in the program offices, flowing up through the Product Divisions, AFSC, and eventually the Air Staff. Many "what-if" exercises occur during POM development and program prioritization. Significant work is thrust upon program control people from both Services to deliver price-outs of different program profiles. At a later point in time the Navy performs a parallel "top-down" POM development conducted largely at the OPNAV level. As fiscal and political constraints are introduced into the POM, the Air Staff and OPNAV frequently make totally uncoordinated changes to their portions of joint programs which always affect the other Service. These changes require that the program office respond to each change from one Service with the impact on the other Service's program.

Logistics Planning - Service practices differ most widely in the area of logistics. Many of the differences stem from the maintenance concepts that reflect the operational environments of the Services and the manner in which equipment is and maintained. The Army recognizes four levels of maintenance (except for airplanes); the Navy and Air Force have three and the depth of maintenance performed at the various levels is inconsistent. Tasks classified as organizational by one Service may be intermediate to another, and these differences may require different technical orders and technical manuals (TOs/TMs) and support equipment for each. Another element contributing to differences in the makeup of TOs/TMs are

variations in the average educational level of enlisted personnel of the three Services.

Each Service also has its own unique automated supply system. Source maintenance and recoverability coding data often vary between the Services for identical items. The process of requisitioning parts from one automated Service system to another often requires a cumbersome manual interface. Even test planning is affected by different Service philosophies. The Army requires that operational testing include evaluation of the same programs and support packages that will actually be fielded so that the entire support package can be validated before the production decision. Air Force operational testing and evaluation is conducted by well-trained people who have closely tracked system development and maintained a close liaison with the contractors. Frequently the support package is in an intermediate stage of development. They test with the operator's viewpoint and interests in mind, but with capabilities and insights exceeding those of a newly-trained operator in a field unit.

The differences in support concepts and procedures between the three Services demands that opportunities for common support in logistics planning be seized early in the program if a degree of commonality, large enough to affect life cycle cost, is to be achieved. Early joint logistics planning could provide a common approach to maintainability and preclude the need for unique support equipment for each Service. Unfortunately, logisticians from all Services are seldom in place in the JPO early enough to do the detailed, coordinated planning that can maximize commonality, minimize interface problems, and achieve a first-order reduction in system life cycle cost.

5.3 RECOMMENDATIONS TO IMPROVE JOINT PROGRAM EXECUTION

The Joint Program Study Team developed several recommendations intended to help resolve the basic problems of program instability and differing Service business practices which have been discussed in this, and previous, chapters. The first recommendation relates to the process of defining a program to control changes, and the second relates to the process of harmonizing Service business practices to reduce the joint program management burden.

5.3.1 Baselining: Commitment Step Three

A program baseline is a brief descriptive document that sets forth basic program requirements, content, and funding profiles, and which establishes a mechanism to control changes to the baseline. Figure 5.3-1 provides a basic descriptive outline of baseline contents and commitments.

The creation of a program baseline should occur just prior to, or immediately after, the start of full-scale development. The baseline represents a reaffirmation of participating Service commitment to the program, and should build on the earlier agreements negotiated by the participating Services. If the earlier recommendations of the Joint Program Study Team are followed with respect to commitment at selection and initiation, the baseline would represent the third and final step to commitment at execution. The sequence of the three steps is represented in Figure 5.3-2.

The creation of a program baseline will accomplish a number of desirable objectives which will help maintain program stability. A baseline agreement will:

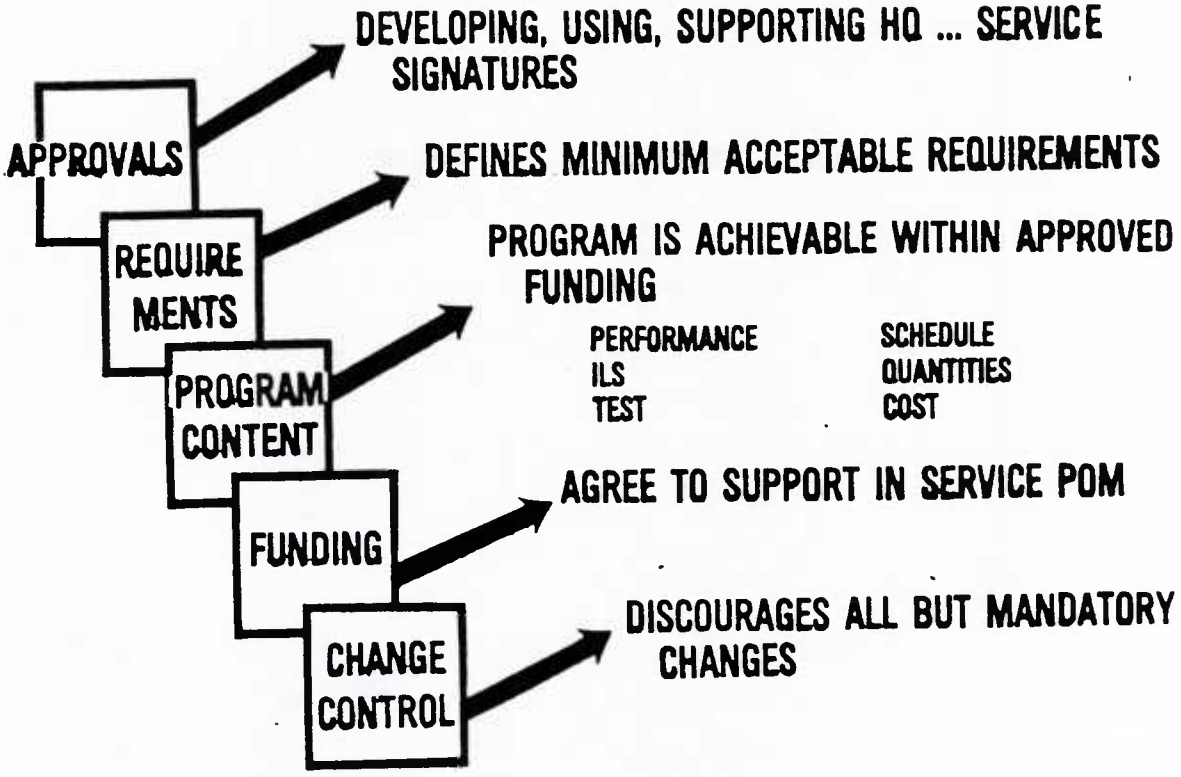

Figure 5.3-1 Baseline Contents

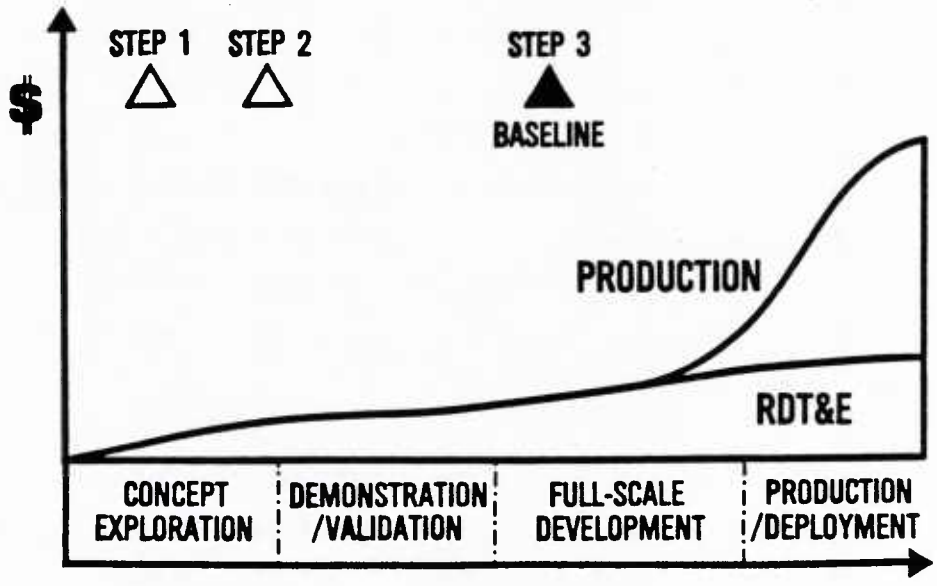

Figure 5.3-2 Three Step Commitment

- Formalize management commitment
- Discourage changes
- Reduce requirements creep
- Provide a disciplined mechanism for cost control
- Establish a basis for performance measurement
- Require strict change control procedures.

In essence, a baseline should provide an increased degree of program stability in requirements, content, and cost. With this stability, the Services should be more willing to maintain the funding commitments initially established for a joint program.

It is important to note that baselining does not preclude program changes; it merely discourages frequent and unnecessary changes. Changes may be introduced during the normal annual budget review cycle or, in unusual circumstances, outside the budget cycle. The changes that are proposed will, however, have to be coordinated with other Services participating in the joint program. Unilateral changes would be specifically prohibited in a baseline environment. Thus, the needed budget flexibility will remain, but not at the cost of unnecessary program instability.

The Air Force has recently adopted the baseline concept in order to stabilize their own programs. The accumulated experience of the Air Force should provide useful precedents for joint program baselines.

5.3.2 Harmonization of Business Practices

Joint programs are initiated with little or no thought as to how different Service business practices might hinder program execution. Each joint program is expected to exert its own initiative, reducing the problems created by jointness to a manageable level. Yet, we have seen that problems due to jointness persist. In fact, issues such as resolution of requirements differences or establishment of cost sharing arrangements consume an appreciable amount of the program manager's time. The effort expended in resolving these unique joint program problems diverts the program manager from the central issue of achieving cost, performance, and schedule goals. When participating Service billets are unfilled, these interface problems become even more difficult and problems are simply not handled. Eventually, however, they resurface, often with a negative impact on cost and schedule. To ease the burden on the joint program manager and the program office staff, some harmony should be introduced into the different business practices of the Services where those differences add no value to the final product.

There are two ways to achieve this harmony. The first entails placing participating Service personnel in the program offices to interpret those business practices that might cause confusion or delays for the other Services. Assignment of skilled personnel from the appropriate disciplines to joint programs would have the greatest impact on minimizing inter-service differences in business practices. This is critical not only for JPOs, but for all program offices with joint responsibilities. For JPOs, the most immediate solution to this staffing problem (that was also addressed in Chapter 4) is higher-level JLC management action that establishes non-revocable staffing requirements for JPOs to which the Services must respond.

For programs in which a JPO is not established, adequate recognition must still be made of the problems the lead Service faces when trying to develop or procure items for another Service. In no joint program, large or small, should it be the program manager's responsibility to dive into a participating Service's management matrix and attempt to effect the proper interfaces. Rather, if matrix management on the part of one Service is unavoidable, the points of contact and their responsibilities and accountability should be established in writing in the project charter or memorandum of agreement. The thrust here is not to force abandonment of matrix management; instead, it is to recognize the difficulties that matrix support can cause in a joint program and to take steps to avoid the resulting problems.

Another method for achieving more harmonious business practices is to strive for standardization of these practices between the Services where possible or practical and where these individual practices do not fill crucial organizational needs. The budget process is one in which changes could be made to minimize the extra work now laid upon joint program offices. Providing new budget estimates with each top-level "what-if" exercise requires significant effort. It is probably not realistic to ask, for example, that the Air Force and Navy unite on a "top-down" or a "bottoms-up" approach to budget development. Over the years each Service has evolved different methodologies that seem best suited to their individual needs. It is realistic, however, to ask the Services in a joint program to coordinate their program changes at previously-agreed upon key dates in order to minimize the duplicative workload on the program offices. Given that final POMs are submitted to OSD at the same time, the Services should be able to agree on earlier dates at which changes to joint programs would be coordinated.

Joint logistics planning is another area that lends itself to harmonization of business practices. Logisticians skilled in the practices of their own Service and knowledgeable about joint logistics planning should be assigned early from all participating Services. The study group's inquiry into logistics (see Appendix H) found that 30 percent of the programs cited identifying a common support concept or resolving problems caused by lack of a common concept to be one of their top three logistics problems. Yet only 36 percent of the logisticians interviewed were familiar with the Standard Integrated Support Management System. Identifying the common support concept will result in greater commonality in test equipment, manuals, training and overhaul practices, and provide better mutual support between Services to common fielded systems.

Rapid changes leading to large-scale harmonization of Service business practices are not practical. The cost of implementing major changes in financial systems, organizations, or even forms, solely for the benefit of joint programs would be prohibitive and probably make such actions indefensible. It is also unrealistic to expect that the inertia opposing such precipitous moves could be quickly overcome. Further, it is not clear that different practices individually cause insurmountable problems. Rather, it is the cumulative effect of many differing business practices that makes execution of joint programs more difficult than necessary. What is needed is a dedicated and tenacious commitment to evolutionary change. Modifications should be made in those policies and practices that are most onerous for joint programs, and a commitment should be made to harmonize new management procedures among the Services as they are being developed.

The JLC can assume a central role in defining those differing Service practices that create the most trauma and in identifying those practices with the greatest feasibility for reasonable change. Many policies and practices originate in Service organizations outside the purview of the JLC, and considerable justification within the Services may be required to accomplish even minimal levels of change. However, the JLC is the only group with sufficient authority to convincingly elucidate the problems created by differing practices. They are, therefore, the best able to pursuade Service heads of the need for change. What can be expected are best-faith efforts on the part of the Services to agree on areas where harmonization would increase joint program effectiveness, action to schedule changes so as to create minimum disruption to on-going routine, and long term commitment to bring about these changes. By careful assessment of the trade-off between the difficulties in making changes and the efficiencies thereby gained, a determined JLC can target areas where change is possible, significantly improving the business environment within which joint programs operate.

Another significant function that the JLC should perform is monitoring the extent to which the Services have adhered to agreements they have made to support joint programs. Many problems uncovered during the study indicated that the Services did not provide the people or the funds to the levels that had been previously arranged. JLC persuasion applied to recalcitrant elements would be welcomed by program managers, who should not themselves have to wrestle with senior Service personnel for the resources to do their job.

6. SUMMARY OF STUDY FINDINGS AND RECOMMENDATIONS

Joint Service acquisition programs are the way of the future for the military Services. Trends over the last ten years clearly indicate that as a percent of all weapon systems programs, joint programs are increasing in both numbers of programs and by dollar amounts. As discussed previously, there are several reasons for this increase. The three primary rationales for creating joint programs are the potential for cost savings that result from economies of scale, advances in technology, and the increased need for joint warfighting and interoperability between the Services. Coupled with this shift toward more joint Service initiatives, there is also a corresponding awareness on the part of organizations external to the Services, in particular OSD and Congress, of the benefits and needs for jointness between the Services. These external pressures tend to deprive the Services of their ability to structure and direct their own operations. By educating its personnel about the joint program environment and by assuming a more participative role in the process of selecting joint programs, the Services can improve the potential for success in joint programs.

The Joint Program Study analyzed the problem of managing joint programs in three distinct phases. The first phase, the selection phase, involves the process whereby weapons acquisition programs are considered for establishment as a joint program. The second phase, initiation, concerns the establishment of the program office including writing the program charter, deciding on the organizational structure of

the office, and staffing the office with the appropriate personnel. The last phase, execution, involves the actual day-to-day management of the program. Section 6.1 of this report presents the major findings for each phase of joint program management. Section 6.2 presents the key recommendations associated with the study findings for each phase.

6.1 SUMMARY OF FINDINGS

6.1.1 Selection Findings

The major finding in the selection phase of joint program management is that the process for choosing programs to be joint is ad hoc. No formal policies or procedures exist whereby programs are selected for jointness, and the attitude of the Services toward joint programs is passive, at best, or even negative. The current requirements generation process is strictly informational and does not result in the actual generation of joint programs. In addition, once a program is designated as joint, there is no advocate to ensure that the program is given the proper upfront support and guidance.

This lack of a formal policy for selecting joint programs creates other problems. In particular, the ad hoc environment is not conducive to creating strong commitments to a program on the part of the services. Lack of commitment, in turn, leads to funding turbulence, difficulty resolving technical requirements, and ultimately, cost and schedule growth.

6.1.2 Initiation Findings

The major problem in the initiation phase results from the fact that joint program offices are not set up to

handle the unique challenges of joint management. In general, joint programs are not organized, staffed, or chartered to deal with joint program issues. Too often joint programs are managed like single Service programs, with little or no recognition of the added complexities that come from working with two or more Services. This is especially true for non-major, joint programs. The structure of the program office must be conducive to meeting the needs of all Services involved. In the case of major programs, this most often means establishing a fully integrated joint program office. Even non-major programs, however, must be set up to provide adequate interface with the participating Service personnel.

The staffing of the program office is also crucial to the successful initiation of the program. The Joint Program Management Study found that the overall manning level (assigned against authorized) of the program office by participating Service personnel was extremely low (66 percent). A joint program cannot function properly without adequate personnel support from all Services.

Finally, joint programs should not only have charters, but these charters should be jointly approved by all Services involved in the program. More than 50 percent of the non-major programs in the data base did not have a charter, and of those that did, less than 50 percent were jointly approved. Approximately 64 percent of major systems did have a charter, but of that two-thirds, only 50 percent were jointly approved. <u>This lack of jointly approved charters is a situation that could and should be remedied to facilitate the smooth and effective functioning of the program office</u>.

6.1.3 Execution Findings

There are two major findings in the execution phase. The first is that joint programs are subject to more program instability than single Service programs. Joint programs have more cost and schedule growth, greater funding turbulence, and more problems with lack of Service commitment. The second major problem in the execution phase is that conflicts arise as a result of the Services' different ways of doing business. This problem can severely hamper program efficiency and occurs over a wide variety of areas, including management philosophies and structures, acquisition strategies, program office organization, the POM process, and contracting procedures.

6.2 RECOMMENDATIONS

6.2.1 Selection Recommendations

The key recommendation for the selection phase is to establish an aggressive and systematic process for selecting joint programs and ensuring that there is adequate and substantial commitment for these programs. Identifying these opportunities for jointness can be effectively handled by the JRMB. The study group recommends the establishment of JLC Subordinate Commanders' groups whose responsibility would be to aggressively search out candidates for joint programs. It is also recommended that all new program starts receive certification that the program does or does not qualify for joint program status. In the case of major programs, this responsibility should fall to the JRMB. For non-major programs, this should be the responsibility of the JLC Subordinate Commanders and the user commands. The other function of the JRMB at this time should be to enforce Service commitment to programs designated as joint. This commitment

should involve collaboration between the Services on a JSOR, the development of a clear MOA, and a willingness to fund the program.

6.2.2 Initiation Recommendations

The recommendation for the initiation phase is to achieve the next level of commitment from the Services to the program. This commitment entails establishing a JPO for major programs and staffing it with sufficient numbers of adequately trained personnel from all Services to handle joint program complexities. For non-major programs, the program office should be organized and staffed to address joint program responsibilities and all programs should be provided with a jointly approved charter.

6.2.3 Execution Recommendations

There are two major recommendations for the execution phase of joint program management. The first is to establish a third level of commitment to the program. This involves baselining all major programs and non-major programs where appropriate. This agreement to baseline the joint program prior to FSD ensures that the plans of the materiel developer and the priorities of the Service headquarters are in accord with each other and formalizes Service commitment to a program. The second recommendation for execution is to deal constructively with the different Service methods of doing business. Where appropriate and viable, the JLCs should standardize business practices between the Services. Where it is not possible or practical to reach such a consensus, the program offices should be staffed with the appropriate personnel to interpret and implement the other Service's business practices so as not to inhibit smooth and efficient execution of the joint program.

GLOSSARY

ACQUISITION LOGISTICS

A planned system of identifying and assessing logistics alternatives, analyzing and resolving Integrated Logistics Support (ILS) deficiencies, and managing ILS throughout the acquisition process.

BASELINING

A process whereby all managers concerned collectively agree on the specific description of the program, requirements, and funding, and make a commitment to manage the program along those guidelines.

DPML - DEPUTY PROGRAM MANAGER FOR LOGISTICS

An experienced logistician who is assigned to a major program office to manage ILS.

FUNDING PROFILE

A tabulation of R&D and Production dollars using a span of years and several criteria to establish a financial picture of the program.

FYDP - FIVE-YEAR DEFENSE PROGRAM

A summary of all approved programs of the entire Defense Department.

ILS - INTEGRATED LOGISTICS SUPPORT

A unified and interactive logistics and management approach that influences both requirements and design; defines support requirements; acquires the needed support; and provides for operational phase support at minimum cost.

JILSP - JOINT INTEGRATED LOGISTICS SUPPORT PLANS

A program document prepared by the executive Service which is objective-oriented at the start and gradually becomes task- and schedule-specific as the acquisition process gains momentum.

JLC PANEL STRUCTURE

The Joint Logistics Commanders' composition of the different groups that comprise its organization as categorized by commodity, technology, or manufacturing area.

JRMB - JOINT REQUIREMENTS AND MANAGEMENT BOARD

A proposed reviewing board composed of high-level Service/JCS personnel that will serve as a "clearing house" for potential joint programs; make recommendations for program success criteria; and resolve disputes once the joint program is underway.

JSOR - JOINT SERVICES OPERATIONAL REQUIREMENT

A document that describes the threat vulnerability and technical requirements of a system.

LEAD SERVICE

The Service that is designated to assume the authority and responsibility for managing the joint program by assigning a program manager and initiating the program charter, and acts as the principal coordinator of interservice relationships.

LSA - LOGISTICS SUPPORT ANALYSIS

An engineering process establishing parameters to identify, define, analyze, quantify, and use logistics support requirements.

MAJOR PROGRAM

A program that meets one of the following criteria for jointness: is a SAR program; of significant interest to OSD and Congress; an R&D program that is greater than $200 million and has all its components; and has production dollars greater than $1 billion and also has all its components.

MANNING LEVELS

The terms used when comparing authorized and assigned personnel strength in a program office.

MOA - MEMORANDUM OF AGREEMENT

An agreement between Services specifying commitments, responsibilities and mutual objectives. In the context of joint program such agreements address a variety of critical programmatic issues such as management practices, cost sharing arrangements, etc.

MOR - MILITARY OPERATIONAL REQUIREMENT

The formal expression of a military need, response to which results in development or acquisition of items, equipment, or systems.

MOU - MEMORANDUM OF UNDERSTANDING

An agreement between Services very similar in purpose to a Memorandum of Agreement (See MOA). An MOU may express a mutual understanding of an issue without implying commitments by parties to the understanding.

NON-MAJOR PROGRAMS

The following criteria determine what is a non-major program:

1. A full system that does not qualify as a major system

2. Performs a major function of a complete system that is either within a major or non-major system

3. A subsystem that is adaptable to a different full system, but is costly to do

4. Is advanced enough to influence program state-of-the-art progress but does not require a prototype or pre-prototype.

ORGANIZATION TYPE

This refers to the management structure of a joint program categorized as follows:

1. SS/C - Single Service Program/Coordinated with Participating Service (s)

   Programs managed by a single Service but having coordination with other participating Services, and some task sharing and joint funding but without the commitment to procure or use the system.

2. SS/COM - Single Service Program/Commitment from Participating Service(s)

   Programs managed by a single Service, with a commitment to use or procure the system

3. JPO - Fully Integrated Joint Program Office

   Programs run by a lead Service-assigned manager and staffed with participating Service personnel. The lead Service acts as the executive agent as agreed to through a charter, MOA, or Joint Operational Procedures (JOPs) with the other participating Services, but participating Services may perform some functions also as directed by the JPO

4. Confederated

   Individual programs with two or more similar components and sharing some task and technology features

5. OSD-Managed

   More than one Service has a program but there is no assigned lead Service. Activities are directed and coordinated directly by OSD or an OSD-established office.

PARTICIPATNG SERVICE

An organization that supports the lead Service in the development of a program by its contribution of personnel and/or funds for the successful completion of the program.

PHASES OF STUDY

The developmental process in a program life cycle consisting of: selection - the process whereby programs are established as joint; initiation - the point at which all joint program elements are started, including agreements, charters, and organization; execution - the management phase of joint programs.

PROGRAM CHARTER

A formal document that outlines the responsibilities and authority of the program manager and the scope of the program.

PROGRAM INSTABILITY

The condition imposed on a program due to problems in requirements, technology, and funding.

R&D COST GROWTH RATE

Compound rate of growth is derived by comparing the original FSD plan to the actual or current plan after making adjustments for quantity changes.

ROC - REQUIRED OPERATIONAL CHARACTERISTICS

System parameters that are primary indicators of the system's capability to be employed to perform the required mission functions, and to be supported.

SCHEDULE GROWTH RATE

Compound rate of growth derived by comparing the original FSD-planned IOC date to the actual or current IOC date.

SISMS - STANDARD INTEGRATED SUPPORT MANAGEMENT SYSTEM

A guide for defining joint logistics operations that have not yet been standardized by the DoD.

SOURCE OF JOINTNESS

The authority that determines the establishment of a joint program, be it internal (within the Service itself) or external (by the OSD or Congress).

STAFFING

A statement of authorized personnel strength in a program office.

SYSTEM TYPE

The kind of equipment, apparatus, or supplies that classifies an acquisition program into aircraft, C^3/NAV/I, component/subsystem, ground combat support, ground combat vehicles, missiles, munitions, ship, space, technology, or weapons.

WITHDRAWAL

The action taken by a Service to pull out its resources of personnel and funds from a partnership with another Service(s) before program completion.

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